

APPLIED ARITHMETIC
THE THREE ESSENTIALS

BOOK 1

LENNES AND JENKINS



APPLIED ARITHMETIC

THE THREE ESSENTIALS

THE COVER DESIGN

The boy and girl are about to push open the dark gates of Ignorance, which, when closed, keep them from entering the threshold of Education, where abide Happiness, Content and Comfort.

Based on Applied Arithmetic, they have a solid foundation on which to stand while forcing back the gates.

The theme of the border design includes the primitive counting method of the Indians, pictured in the knotted leather thongs. The artist has employed in the corners the devices of the ancient abacus and the modern type of mechanical calculator.

LENNES AND JENKINS

LIPPINCOTT'S SCHOOL TEXT SERIES

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DEAN, COLLEGE OF EDUCATION, STATE UNIVERSITY OF IOWA

APPLIED ARITHMETIC

THE THREE ESSENTIALS

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BOOK I



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PREFACE

THIS book is the first of a three-book series, and is intended to cover the work in Arithmetic of the second, third, and fourth grades. The principles which have guided the authors may be grouped under three main heads:

1. *Selection and Organization of Subject Matter.* Recent discussion and practice, as revealed in the literature and in published curricula, seem to show substantial agreement as to what topics should be included in the earlier part of a course in Arithmetic, while there is yet considerable difference of opinion as to topics to be included in the later parts. All topics whose inclusion or exclusion is now being debated are placed among the supplementary topics at the end of Books II and III. The main body of each book furnishes a minimum course, which may be studied without break in continuity. At points noted in the text supplementary topics may be taken up. It is believed that in this respect these books will serve each of many different needs just as effectively as if they were prepared to meet each need exclusively. The business of the maker of text books is to furnish teachers and supervising officers effective instruments for carrying out their purposes, rather than to seek to impose rigidly his own personal predilections or whims.

It has been the purpose of the authors to arrange the subject matter in such a manner that the greatest simplicity of treatment may be attained. In the first book this is exemplified by the relating of the fundamental combinations, as shown on pages 17, 31, 34 for the addition and subtraction combinations, and on pages 20, 29, 36, 48, 56, 98,

100, 101, 133 for the multiplication and division combinations. In order to simplify the development, effort has been made to break up larger difficulties into smaller constituent difficulties. On this point see the development of addition, pages 72 to 86; the development of subtraction, pages 92 and 113 to 117; the development of multiplication, pages 126 and 148 to 152; and the development of long division, pages 231 to 239, and 252 and 253.

In the later books this unifying and simplifying of the subject matter has been carried out in many ways.

2. *Derivation and Application.* It is commonplace to remark that the elementary facts of Arithmetic should be derived from the child's own experiences. But practice has not been in uniform accord with this commonplace. Too frequently use has been made of material that actually comes within the experience of a comparatively small number of children. Thus, manual training may furnish most excellent sources for number work, *provided* the child has had experience with just that kind of manual training; otherwise it is very bad material. The authors believe that in these books the elementary facts of Arithmetic are derived from situations which are within the range of experience of nearly all normal children. Not infrequently books have been based on work done in some one very excellent school or system of schools, where the children have been subjected to special experiences, such as construction work. When such books are placed in the hands of children not subjected to these particular experiences, the result is disastrous.

The applications of Arithmetic should likewise be made to things of *general* child interest. The most effective applications of Arithmetic can be made only when considerable local material is brought in. Such material is most effective

when brought in by the child itself. For these reasons there are throughout these books many suggestions for the making of problems by the children. On this point see the pages referred to in the index under the heading, "Making New Problems."

3. *Motivation.* The subject matter of Arithmetic can be motivated most effectively only when the freest possible use is made of the child's many spontaneous interests. The authors have not neglected any opportunity that has occurred to them to interest the child in the subject matter itself and its manifold applications. They have recognized, however, that it is possible so to connect the learning of Arithmetic with other activities which in themselves are of compelling interest to the child, that the combination will be a source of joy and life when the Arithmetic elements alone would lead to sadness and forced labor. For this reason systematic use has been made of games of group competition and many simpler games. On this point see the pages referred to in the index under the heads, "Games used in drills in Addition," "Games used in drills in Subtraction," and so on.

Some other points may be mentioned. The best existing information on the relative difficulties that children have in learning and retaining the various fundamental combinations has been made use of, and the more difficult combinations have been repeated more frequently in drills and reviews. Moreover, each child is encouraged to make lists of combinations of exceptional difficulty, and to study them separately. See pages referred to in the index under the title, "Difficult Combinations."

The formal setting out of each new number fact as it is first learned should help to create definite responsibility on the part of the child for the important things he is to learn.

No effort has been spared to make the books attractive in appearance and convenient in the arrangement of subject matter on the page.

The reason for producing this series lies in the belief that by careful and systematic use of all that is best in present knowledge and usage it should be possible to produce a series of texts that would more adequately meet the requirements of the modern school than any now in existence.

These books have been built leisurely. The first draft was made nearly ten years ago. During the intervening time the work of selecting what has proved most certainly valuable, both in what is old and what is new, and in organizing and relating the various parts, has been in constant progress. It is difficult, if not impossible, to make proper acknowledgment to all who have helped in this work. The most prominent among these, however, have been Dr. Theodore Lindquist, Head of the Department of Mathematics in the State Normal School at Emporia, Kansas, and Mr. H. C. Pearson, Principal of the Horace Mann School in the City of New York, and several of his corps of teachers.

THE AUTHORS.

MAY, 1919.

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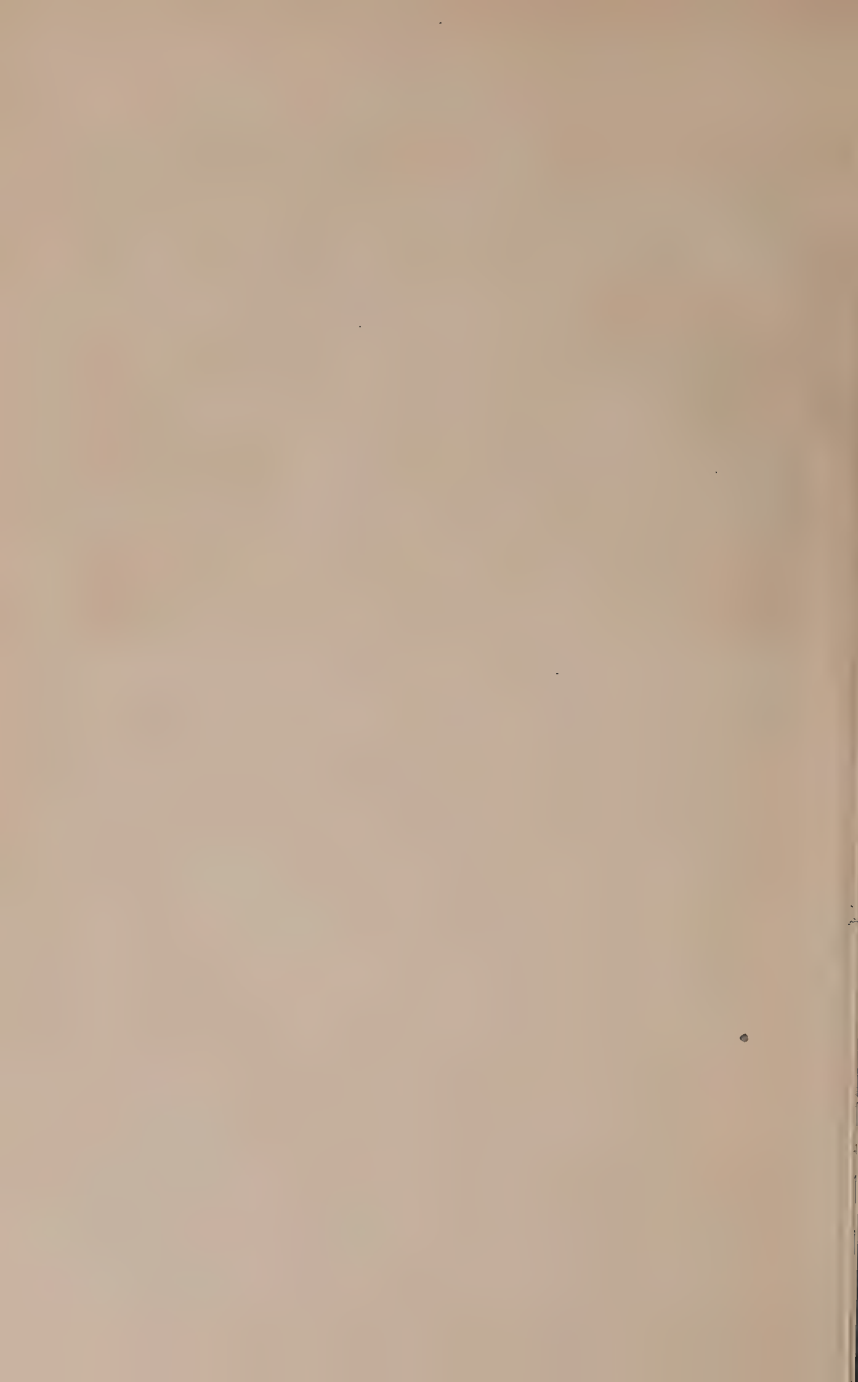
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APPLIED ARITHMETIC

THE THREE ESSENTIALS



CHAPTER I

COUNTING

1. How many children are there in the picture?
How do you find out how many there are?
2. How many boys are there in the picture?
3. How many girls are there in the picture?
4. How many children are there in each group?
5. Two boys and one boy are how many boys?
6. Three girls and one girl are how many girls?
7. Each child swings twenty times. Count for one child to swing.
8. If you have a swing at home, play as these children are playing.

Count the books in each group.



1 book



2 books



3 books



4 books



5 books

Write the figures which mean *one, two, three, four, five*.
Read the next two lines:

• • •• •• • ••• •• •• ••••
1 and 1 are 2 2 and 1 are 3 2 and 2 are 4.

••• • •• •• • ••• •• ••• •••
3 and 1 are 4 4 and 1 are 5 2 and 3 are 5.

The sign $+$ means **and** or **plus**.

The sign $=$ means **are, is, equal, or equals**.

“3 and 2 are 5” is written “ $3+2=5$ ”

The signs are used because they are shorter and easier to write than the words.

Read:

$1+3=4$, $2+2=4$, $3+1=4$, $4+1=5$, $3+2=5$.

New Number Facts

$1+1=2$	$2+2=4$	$4+1=5$
$2+1=3$	$3+1=4$	$3+2=5$

To **add** 2 dots and 3 dots we take them together to make 5 dots. The 5 dots are the **sum** of the 2 dots and the 3 dots.

In $3+2=5$, the numbers 3 and 2 are added. The sum is 5.

ORAL EXERCISES

What are these children doing?

1. How many boys are there in the picture?



2. How many children are there in the picture?

3. How many girls are there in the picture?

4. Two children and one child are how many children?

5. Three children and two children are how many children?

6. Mary has three apples. John gives her one more. How many has she then?

7. John has four apples and eats one of them. How many has he left?

8. Mary says: "Jennie has four apples and picks up one more. apples."

Then she has

9. Jennie tells this story: "John throws two apples to Mary and two to Harry. In all he throws apples."

10. John tells this story: "Tom has two apples and picks up three more. Then he has apples."

11. Henry tells this story: "Mary has five apples and gives three to her brother. Then she has apples."

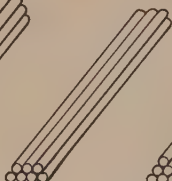
12. Tell some more number stories about apples. See who can tell the best story.

ORAL AND WRITTEN EXERCISES

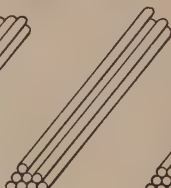
1. Count the splints in each bundle.



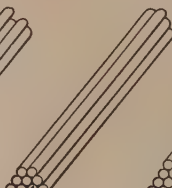
6 splints



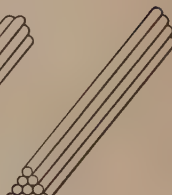
7 splints



8 splints

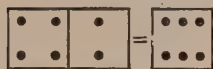


9 splints



10 splints

2. Write the figures which mean *six*, *seven*, *eight*, *nine*, and *ten*. Make the figures large and clear.



$$4 + 2 = 6$$



$$5 + 1 = 6$$



$$3 + 3 = 6$$

3. Read the line above.

4. Is $3 + 2$ equal to $2 + 3$?

Is $3 + 1$ equal to $1 + 3$?



5. Is $4 + 1$ equal to $1 + 4$?

Is $5 + 1$ equal to $1 + 5$?



6. Make cards to show $2 + 1$, $1 + 2$, $2 + 2$, $3 + 1$, $1 + 3$.

When numbers are to be added they are usually written one above the other to form a column. The sum is then placed below a line drawn under the column.

2
3
5

Read and give sums rapidly:

7.	2	1	3	1	2	4	1
	1	2	1	3	2	1	4
	—	—	—	—	—	—	—
8.	4	2	3	2	3	5	1
	2	4	2	3	3	1	5
	—	—	—	—	—	—	—

New Number Facts	
$4 + 2 = 6$	
$5 + 1 = 6$	
$3 + 3 = 6$	



ORAL EXERCISES

What are these children doing?

1. How many children are running to hide?
2. Five children and one child are how many children?
3. How many children are running around the right end of the house?
4. Four children and two children are how many children?
5. Three children and three children are how many children?
6. Three children and two children are how many children?
7. The child that is blind-folded is counting. Count as far as you can.
8. Tell some number stories about children playing hide-and-seek.

Use these sums in your stories:

$$1+3, 1+4, 2+2, 5+1, 4+2, 2+3, 3+3$$

ORAL EXERCISES

1. Find the missing number in $5 = 3 + ?$ This means "find the number which must be added to 3 to make 5."

The question mark stands for the missing number.

Read the example this way: "5 equals 3 plus 2."

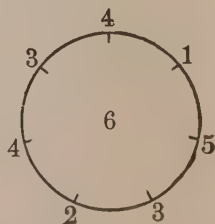
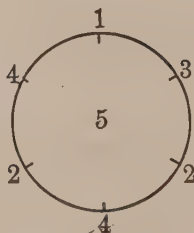
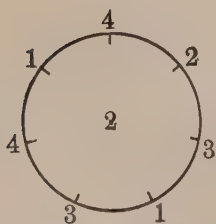
Read and supply the missing numbers:

- | | | | | |
|----|-------------|-------------|-------------|-------------|
| 2. | $3 = 2 + ?$ | $3 = 1 + ?$ | $4 = 3 + ?$ | $4 = 1 + ?$ |
| 3. | $5 = 4 + ?$ | $5 = 1 + ?$ | $5 = 3 + ?$ | $5 = 2 + ?$ |
| 4. | $6 = 5 + ?$ | $6 = 1 + ?$ | $6 = 4 + ?$ | $6 = 2 + ?$ |
| 5. | $2 = 1 + ?$ | $4 = 2 + ?$ | $6 = 3 + ?$ | $5 = 2 + ?$ |

Add:

- | | | | | | | | | |
|----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 6. | 2 | 1 | 3 | 1 | 4 | 1 | 4 | 2 |
| | 1 | 2 | 1 | 3 | 1 | 4 | 2 | 4 |
| | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> |

7. Give all the combinations that make 4.
8. Give all the combinations that make 5.
9. Give all the combinations that make 6.
10. In the first circle add the number inside the circle to the numbers outside it.



11. In the other circles add enough to the outside numbers to make the sum the inside numbers. Give the inside number first. Read the examples this way: $5 = 2 + 3$.



ORAL EXERCISES

1. How many little chickens are there in the picture?
2. How many tired little chickens are coming home behind the others?
3. Four chickens and two chickens are how many chickens?
4. The mother hen calls "Cluck, cluck, cluck, cluck, cluck, cluck, cluck, cluck, cluck, cluck." How many times does she call?
5. All the chickens went into the field with their mother. Three chickens walked on one side of her, two walked on the other side. One chicken walked behind her. How many chickens went into the field?
6. William tells this number story about little chickens:
"A hen had 6 chickens and lost 2 of them. Then she had chickens." What is the number left out?
7. Tell some more number stories about little chickens.

Use these sums in your stories:

$$3+3, 2+3, 2+4, 2+2, 1+5, 4+1$$

3					4				
4					3				
<u>7</u>					<u>7</u>				

ORAL EXERCISES

1. Add: 4 5 6
 3 2 1

If you have trouble in finding the sums make dots or marks and count them. Learn these sums so that you know them well.

Give sums rapidly:

2.	4	3	5	2	6	1	3	2
	<u>3</u>	<u>4</u>	<u>2</u>	<u>5</u>	<u>1</u>	<u>6</u>	<u>3</u>	<u>2</u>
3.	3	2	4	2	5	1	3	1
	<u>2</u>	<u>3</u>	<u>2</u>	<u>4</u>	<u>1</u>	<u>5</u>	<u>1</u>	<u>3</u>

Drill on these so that you can use them quickly in reading the stories on the next page.

New Number Facts
 $6+1=7$ $5+2=7$ $4+3=7$

Read and supply the missing numbers.

4.	$7=4+?$	$7=3+?$	$7=5+?$	$7=2+?$
5.	$7=6+?$	$7=1+?$	$6=5+?$	$6=1+?$
6.	$6=4+?$	$6=2+?$	$5=4+?$	$5=1+?$
7.	$5=3+?$	$5=2+?$	$4=3+?$	$4=1+?$
8.	$3=2+?$	$3=1+?$	$6=3+?$	$4=2+?$

WRITTEN EXERCISES

9. Write all combinations that make 7.
 10. Write all combinations that make 6.

ORAL EXERCISES

1. The boys buy a spool of thread for 4 cents and a skein of silk for 3 cents. How much do they pay for both?
2. The price of a paper of needles is 5 cents. How much do they pay for one paper of needles and one two-cent stamp?
3. How much would they have to pay for two two-cent stamps?
4. The price of a skein of silk is 3 cents. How much would they pay for two skeins of silk?
5. How much would they pay for a spool of thread and a three-cent stamp?



These boys are going to the store for their mother.

A stick of candy for 1 cent
A stamp for 2 cents
A skein of silk for 3 cents
A spool of thread for 4 cents
A paper of needles for 5 cents

6. How much would they pay for a paper of needles and a stick of candy?
7. How much would they pay for 2 sticks of candy and a spool of thread?
8. How much would they pay for a skein of silk and 3 sticks of candy?
9. Make other number stories about going to the store.

ORAL EXERCISES

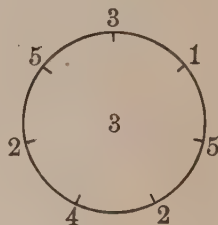
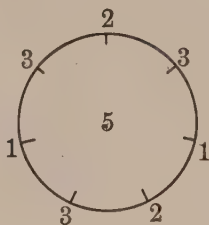
1. Cut out little squares of paper and put them together like they are in this figure.

The figure shows that $4 + 4 = 8$

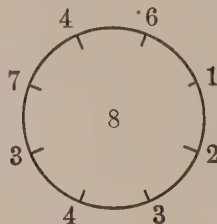


2. Add: $\begin{array}{r} 4 \\ 4 \\ \hline \end{array}$ $\begin{array}{r} 5 \\ 3 \\ \hline \end{array}$ $\begin{array}{r} 6 \\ 2 \\ \hline \end{array}$ $\begin{array}{r} 7 \\ 1 \\ \hline \end{array}$

If you have trouble in finding the sums draw squares or make marks and add them. Learn these sums so that you know them well.



3. Add the number inside each circle to the numbers outside the circle. See how fast you can go around each circle without making a mistake.



New Number Facts

$$4 + 4 = 8$$

$$5 + 3 = 8$$

$$6 + 2 = 8$$

$$7 + 1 = 8$$

4. In these circles add enough to the outside numbers to make the sums the inside numbers. See how fast you can go around each circle without making a mistake. Go around the circles both ways.

ORAL EXERCISES

Add:

1.	4	5	2	5	3	3	2	6	2
	4	2	5	3	5	2	3	2	6
	—	—	—	—	—	—	—	—	—
2.	7	1	2	1	2	4	3	4	2
	1	7	1	2	2	3	4	2	4
	—	—	—	—	—	—	—	—	—
3.	3	1	5	1	4	1	6	1	3
	1	3	1	5	1	4	1	6	3
	—	—	—	—	—	—	—	—	—

Read and supply the missing numbers:

4.	5=3+?	5=2+?	5=4+?	5=1+?
5.	6=5+?	6=1+?	6=4+?	6=2+?
6.	7=4+?	7=3+?	7=5+?	7=2+?
7.	7=6+?	7=1+?	8=7+?	8=1+?
8.	8=6+?	8=2+?	8=5+?	8=3+?
9.	2=1+?	4=2+?	6=3+?	8=4+?

Give sums rapidly:

10.	1	3	2	4	3	4	2	6	3
	3	1	4	2	4	3	6	2	3
	—	—	—	—	—	—	—	—	—
11.	4	2	1	2	3	2	5	1	4
	4	2	2	3	2	5	2	4	1
	—	—	—	—	—	—	—	—	—
12.	1	7	3	5	4	1	6	1	5
	7	1	5	3	4	6	1	5	1
	—	—	—	—	—	—	—	—	—

WRITTEN EXERCISES

1. Write all the combinations that make 6.
2. Write all the combinations that make 7.
3. Write all the combinations that make 8.



$$5 + 4 = 9$$



$$5 + 5 = 10$$

ORAL AND WRITTEN EXERCISES

1. How many cents are 8 cents and 1 cent? 7 cents and 2 cents? 6 cents and 3 cents? 5 cents and 4 cents? Make rings to show each of these.
2. How many cents are 9 cents and 1 cent? 8 cents and 2 cents? 7 cents and 3 cents? 6 cents and 4 cents? 5 cents and 5 cents? Make rings or dots to show each of these.
3. Make dots to show how many cents you must add to 6 cents to make 9 cents.
4. John has 9 cents and spends 3 cents; how many cents has he left?
5. Make dots to show how many cents you must add to 6 cents to make 10 cents.
6. Mary has 10 cents and spends 6 cents; how many cents has she left?
7. Tell some number stories about spending money.

New Number Facts

$$8 + 1 = 9$$

$$5 + 4 = 9$$

$$7 + 3 = 10$$

$$7 + 2 = 9$$

$$9 + 1 = 10$$

$$6 + 4 = 10$$

$$6 + 3 = 9$$

$$8 + 2 = 10$$

$$5 + 5 = 10$$

Learn these new number facts well, so that you can use them in finding the sums on the next page.

ORAL EXERCISES

Add:

1.	8 2 —	2 8 —	6 3 —	3 6 —	7 2 —	2 7 —	6 4 —	4 6 —	5 5 —
2.	9 1 —	1 9 —	5 4 —	4 5 —	8 1 —	1 8 —	7 3 —	3 7 —	2 2 —
3.	6 2 —	2 6 —	5 2 —	2 5 —	4 3 —	3 4 —	5 3 —	3 5 —	4 4 —
4.	1 1 —	1 3 —	6 1 —	1 6 —	2 4 —	6 3 —	5 4 —	3 5 —	7 2 —
5.	3 3 —	4 3 —	3 4 —	2 7 —	5 3 —	5 4 —	6 3 —	8 2 —	6 4 —

Read and supply the missing numbers:

6.	$10 = 9 + ?$	$10 = 1 + ?$	$10 = 8 + ?$	$10 = 2 + ?$
7.	$10 = 7 + ?$	$10 = 3 + ?$	$10 = 4 + ?$	$10 = 6 + ?$
8.	$9 = 8 + ?$	$9 = 1 + ?$	$9 = 7 + ?$	$9 = 2 + ?$
9.	$9 = 6 + ?$	$9 = 3 + ?$	$9 = 5 + ?$	$9 = 4 + ?$
10.	$8 = 7 + ?$	$8 = 1 + ?$	$8 = 6 + ?$	$8 = 2 + ?$
11.	$8 = 5 + ?$	$8 = 3 + ?$	$7 = 6 + ?$	$7 = 1 + ?$
12.	$7 = 2 + ?$	$7 = 5 + ?$	$7 = 4 + ?$	$7 = 3 + ?$
13.	$6 = 4 + ?$	$5 = 2 + ?$	$5 = 3 + ?$	$6 = 3 + ?$

14. Make circles on the board like those shown on page 10 and see how fast you can go around them without making a mistake. The teacher will help you to make the circles and write the numbers. First decide the largest number you can use as a sum. How will this help you writing the numbers?



ORAL EXERCISES

1. Henry is 6 years old. Elsie is 2 years older than Henry.
How old is Elsie?
2. If Henry is 6 years old to-day, how old will he be 3 years from now?
3. If Elsie is 8 years old now, how old will she be 2 years from now?
4. If Elsie is 8 years old now, how old was she 3 years ago?
How old was she 5 years ago?
5. If John is 6 years old now, how old was he 3 years ago?
6. How many pages have you studied in your arithmetic this year? Count till you come to this number.
7. On what page is your reading lesson today? Count till you come to this number.
8. How many pages are there in the longest story in your reader? In the shortest?
9. If you read four pages each day, how many pages will you read in two days?
10. If you read five pages each day, how many pages will you read in two days?

ORAL EXERCISES

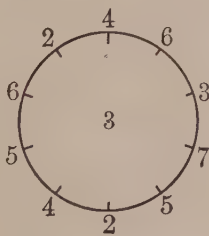
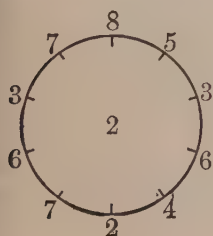
1. Give the sum of the two numbers on each step of this ladder going up. See how fast you can climb the ladder. Then see how fast you can come down again.

When the children make mistakes they say they fall off the ladder.

2. Add the numbers outside the first circle to the number in the center. See how quickly you can go around the circle. First go around the circle one way, and then the other way.

Do the same with the other two circles.

The children call this running around the circle. When they make mistakes they say they fall down.



3. Make circles on the board like these and see how fast you can run around them without falling. The teacher will help you to make the circles.
4. Make a number ladder on the board, and see how fast you can climb it without falling off.



These children are playing store. They use play money.

Five cents = one nickel.
Ten cents = one dime.

ORAL EXERCISES

1. John buys a top for 4 cents. If he gives the storekeeper a dime, how much change does he get? In making change the storekeeper starts with 4 cents, and then adds enough to make 10 cents. He gives John the top and says: "4 cents;" then he puts down a penny and says: "5 cents;" then puts down a nickel and says: "10 cents." That is, he finds what must be added to 4 cents to make 10 cents.
2. Mary buys a mud cake for 5 cents and some crackers for 4 cents. How much must she pay?
3. Henry tells a story about playing store. He says: "I bought a whistle for 3 cents and a ball for 6 cents. I paid _____ cents for both together."
4. Play store. Tell some stories about playing store. Make change as the storekeeper does.

Problem. John had 7 marbles in a bag and took out 3 of them; how many were left in the bag?

We can find the answer to this question in two ways, and the teacher will tell you which one you are to use.

If the marbles left in the bag are added to those taken out, we know that the sum is 7 marbles. But we know that 4 must be added to 3 to make 7, and so we know that there are 4 marbles left in the bag. } First Method

We can find by counting that if we have 7 things and take away 3 of them we will have 4 left. So we know that there are 4 marbles left in the bag. } Second Method

Subtraction is taking away.

The sign $-$ is the sign of Subtraction. It is read less or minus.

When 3 is to be subtracted from 7 the problem may be written $7-3=?$. This is read "7 less 3=what?" or "7 minus 3=what?" When you know that $4+3=7$ you should know at once the missing number in $7-3=?$, $7-4=?$.

Instead of $7-3=?$ or $7=3+?$ we often write the smaller number below the larger and then say "subtract".

7
3
—
4

ORAL EXERCISES

Subtract:

- | | | | | | | | | | |
|----|---------|---|----------|---|---------|---|----------|---|---|
| 1 | 10 | 8 | 4 | 9 | 10 | 8 | 9 | 7 | 7 |
| | 6 | 3 | 2 | 3 | 5 | 4 | 4 | 3 | 5 |
| | — | — | — | — | — | — | — | — | — |
| 2. | $8-2=?$ | | $7-4=?$ | | $9-6=?$ | | $8-3=?$ | | |
| 3. | $7-5=?$ | | $10-8=?$ | | $7-3=?$ | | $10-7=?$ | | |



ORAL EXERCISES

1. Count these boys by 2's, thus: 2, 4, 6, 8, 10.
2. Count by 2's // // // //
3. How many 2's are there in 4?
4. Three 2's are how many?

5. Four 2's are how many? Draw squares to show this.

Instead of "four 2's are 8" we write $4 \times 2 = 8$, and read it "4 times 2 are 8" or "4 times 2 equal 8."

The sign $\times$ is read **times** or **time**.

We say that in $4 \times 2 = 8$, 2 is *multiplied* by 4, and that the *product* of 4 and 2 is 8.

6. Read and supply the missing numbers in:
 $2 \times 2 = ?$ $4 \times 2 = ?$ $3 \times 2 = ?$ $5 \times 2 = ?$
7. From $: | : | : = :: :$ we see that $3 \times 2 = 2 \times 3$.
 Make dots to show that $4 \times 2 = 2 \times 4$ and $5 \times 2 = 2 \times 5$.

New Number Facts

$2 \times 2 = 4$	$3 \times 2 = 6$	$4 \times 2 = 8$	$5 \times 2 = 10$
	$2 \times 3 = 6$	$2 \times 4 = 8$	$2 \times 5 = 10$

8. At two cents each what is the cost of 4 stamps?



The teacher shows the class a card with the numbers 4 and 5 on it, and the children write the sum 9.

She next shows a card with 4 and 3, and the children write the sum 7.

When she has shown 5 cards, each child should have five answers. The row with the fewest mistakes gets the flag.

Play this game until you can give the sums quickly and without making any mistakes.

If some combination gives you trouble, write it down and make sure you learn it.

The pupils can help to make the cards by writing the numbers on them.

WRITTEN EXERCISES

1. Write all the combinations that make 8.

Thus, $\begin{array}{|c|} \hline 1 \\ \hline 7 \\ \hline \end{array}$, $\begin{array}{|c|} \hline 2 \\ \hline 6 \\ \hline \end{array}$, etc.

2. Write all the combinations that make 9.
3. Write all the combinations that make 10.



ORAL EXERCISES

1. How many nuts are there in each group? How many nuts are there altogether?
2. Count to nine by 3's.
3. Count to 10 by 3's beginning with 1. / /// /// ///
4. Count to 8 by 3's beginning with 2. Show this.
5. How many groups of 3 dots can you make out of 6 dots?
6. How many groups of 2 dots can you make out of 6 dots?
7. How many groups of 3 dots can you make out of 9 dots?
8. Read and supply the missing numbers in:
 $2 \times 3 = ?$ $3 \times 2 = ?$ $3 \times 3 = ?$

Instead of "how many 2's are there in 6," we write $? \times 2 = 6$.

New Number Fact, $3 \times 3 = 9$

WRITTEN EXERCISES

Copy and supply the missing numbers in the following:

- | | | | |
|---------------------|---------------------|---------------------|---------------------|
| 1. $2 \times 2 = ?$ | 2. $2 \times 3 = ?$ | 3. $4 \times 2 = ?$ | 4. $5 \times 2 = ?$ |
| $? \times 2 = 4$ | $3 \times 2 = ?$ | $2 \times 4 = ?$ | $2 \times 5 = ?$ |
| $2 \times ? = 4$ | $? \times 3 = 6$ | $? \times 2 = 8$ | $? \times 2 = 10$ |
| $3 \times 3 = ?$ | $2 \times ? = 6$ | $4 \times ? = 8$ | $5 \times ? = 10$ |
| $? \times 3 = 9$ | $? \times 2 = 6$ | $? \times 4 = 8$ | $? \times 5 = 10$ |
| $3 \times ? = 9$ | $3 \times ? = 6$ | $2 \times ? = 8$ | $2 \times ? = 10$ |

At a book-store prices of school-supplies are:

Pencil	1 cent	Tablet	3 cents
Eraser	3 cents	Box of crayons	5 cents
Ruler	1 cent	Small paste tube	4 cents
Penholder	2 cents	Blank Book	6 cents

ORAL EXERCISES

1. Are these prices higher or lower than those you pay at your book-store?
2. What is the cost of a pencil and a tablet?
3. What is the cost of a ruler, a pencil, and an eraser?
4. What is the cost of 2 penholders? Of 2 tablets? Of 3 erasers? Of 2 paste tubes?
5. What is the cost of a paste tube and a blank book?
6. What is the cost of an eraser and a box of crayons?
7. What can you buy for 5 cents?
8. What can you buy for 7 cents?
9. What can you buy for 8 cents?
10. What can you buy for 9 cents?
11. What can you buy for 10 cents?
12. How much more does a blank book cost than a penholder?
13. How much more does a paste tube cost than a tablet?
14. If you have 10 cents and buy a blank book for 6 cents, how much have you left?
15. If you have 10 cents and buy a paste tube for 6 cents, how much have you left?
16. Tell number stories about buying things at this store.



ORAL EXERCISES

1. How many mice are there in the group to the left? In the group to the right?
2. Five mice and six mice are how many mice?



3. How many mice are 10 mice and 1 mouse?
4. How many mice are 9 mice and 2 mice? 8 mice and 3 mice? 7 mice and 4 mice?
5. How many mice has the cat caught? How many are running away?
6. If the cat had caught 2 mice, how many would be left?
7. How many would be left if the cat had caught 3 mice? If she had caught 4 mice?
8. How many of these mice would be left if the cat caught 5 of them? If she caught 6 of them?
9. Tell number stories about mice and a cat. See who can tell the best stories.

The number eleven is written 11.

New Number Facts

$$9 + 2 = 11 \quad 8 + 3 = 11 \quad 7 + 4 = 11 \quad 6 + 5 = 11$$

The most important addition facts are those in which both numbers to be added are less than 10. Only those are given in the "New Number Facts."

Add:

ORAL EXERCISES

9	2	8	3	7	4	6	5	5
2	9	3	8	4	7	5	6	5
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

WRITTEN EXERCISES

1. Write all the combinations that make 11.

Make a card like this to show each combination.



Subtract:

2.	11	11	11	11	11	11	11	11
	9	2	8	3	7	4	6	5
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
3.	10	10	10	10	10	10	10	10
	9	1	8	2	7	3	6	4
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
4.	9	9	9	9	9	9	9	8
	8	1	7	2	6	3	4	5
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

5. Play the game on page 19 using numbers whose sums are 7 or less.
6. Play the game on page 19 using mixed cards with numbers whose sums are 8, 9, 10, 11.

Make a list of combinations that give you trouble, and practice on them until you know them well.



These children are playing a number game. John stands up and closes his eyes while the teacher writes a number combination as, $5+7$, on the board and then erases it. John opens his eyes and the other children say: "The sum is 12." John then says: "Is it $4+8=12$?" "No, it is not $4+8=12$." "Is it $6+6=12$?" "No, it is not $6+6=12$." "Is it $5+7=12$?" Then the children clap their hands. If John makes a mistake, he sits down, and the child who first notices the mistake takes his place and closes his eyes, while the teacher writes a new combination on the board. If John makes no mistakes he is allowed to guess for two sums.

ORAL EXERCISES

1. Beginning with 1, add 2 to each number around the circle.

See how fast you can go around without making a mistake. Also go around in the other direction.

2. Beginning with 1, add 3 to each number around the circle, add 4 to each number. Go around both ways.

3. Beginning with 1, add enough to each number around the circle to make the sum 10.





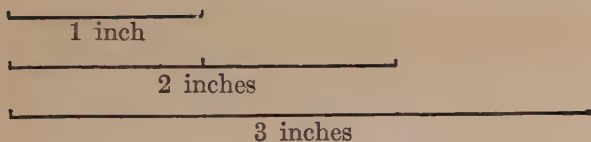
Mary's Score	Tom's Score	James' Score
3	2	2
2	0	1
1	2	0
1	1	1
—	—	—

These children are playing bean-bag. Each child throws four bags. A bag counts 3 when it goes inside the smallest circle, 2 when it goes inside the next, but not inside the smallest; and 1 when it goes inside the largest, but not inside the next one. When the bag misses all the circles, it does not count anything. Then the score-keeper marks 0.

The figure 0 means *not any*, and is called **naught** or **zero**.

ORAL EXERCISES

1. Add the score of each child. Adding Mary's score, say 3, 5, 6, 7. Do not say $3+2=5$, $5+1=6$, $6+1=7$.
2. What is the difference between Mary's score and Tom's score? between Mary's and James'? between Tom's and James'?



ORAL EXERCISES

1. On a foot ruler show 1 inch, 2 inches, 3 inches, 4 inches, 5 inches, 6 inches.
2. How many inches wide do you think this page is? Measure to see if you are right.
3. How many inches long do you think this page is? Measure to see if you are right.
4. How many inches long is your ruler?

Twelve **inches** = one **foot**. (12 in. = 1 ft.)

Sometimes we write ft. instead of foot or feet, and in. instead of inch or inches.

5. 6 inches and 6 inches are how many inches?
6. 8 inches and 4 inches are how many inches?
7. 10 inches and 2 inches are how many inches?
8. John has one pencil 4 inches long and another 5 inches long. How long are the two pencils together?
9. 9 inches and 3 inches are how many inches?

Play a game estimating the lengths of lines drawn on the board. All the children make estimates. Then they measure to see who is most nearly right. The number of inches by which a child's estimate misses is put down, and the sum for ten estimates is found. The child with the smallest score wins. Measures are all made to the nearest inch.

When a thing is divided into two equal parts
each part is called **one-half** of the thing.
One-half is written $\frac{1}{2}$ or $\frac{1}{2}$.

ORAL AND WRITTEN EXERCISES

1. Point to one-half of the 4 dots. . .
 $\frac{1}{2}$ of 4 is how many? . .
2. Point to one-half of the 6 dots. . . .
 $\frac{1}{2}$ of 6 is how many?
3. Point to one-half of the 8 dots. . . .
 $\frac{1}{2}$ of 8 is how many?
4. $\frac{1}{2}$ of 10 is how many? ///// /////
5. $\frac{1}{2}$ of 12 is how many? * * * * * *
- * * * * * *
6. How many inches are there in a foot ruler? How many
inches are there in $\frac{1}{2}$ of a foot ruler?
7. Draw a line 6 inches long. How many inches are there
in $\frac{1}{2}$ of it?
8. Draw a line 10 inches long. How many inches are there
in $\frac{1}{2}$ of it?
9. If you have 4 apples and give away $\frac{1}{2}$ of them, how
many do you give away?
10. If you have 10 cents and spend $\frac{1}{2}$ of them how many
cents have you left?
11. Read and give the missing numbers:
 $\frac{1}{2}$ of 6 = ? $\frac{1}{2}$ of 8 = ? $\frac{1}{2}$ of 10 = ? $\frac{1}{2}$ of 12 = ?
3 is $\frac{1}{2}$ of ? 4 is $\frac{1}{2}$ of ? 5 is $\frac{1}{2}$ of ? 6 is $\frac{1}{2}$ of ?
12. Tell number stories about halves of numbers.

When a thing is divided into four equal parts each part is called **one-fourth** of the thing.

One-fourth is written $\frac{1}{4}$ or $\frac{1}{4}$.

When a thing is divided into three equal parts, each part is called **one-third** of the thing.

One-third is written $\frac{1}{3}$ or $\frac{1}{3}$.

ORAL EXERCISES

1. Point to $\frac{1}{4}$ of the 4 dots. . .
 $\frac{1}{4}$ of 4 is how many? . . .
2. Point to $\frac{1}{4}$ of the 8 stars. * * * *
 $\frac{1}{4}$ of 8 is how many? * * * *
3. Point to $\frac{1}{3}$ of the 6 dots. . . .
 $\frac{1}{3}$ of 6 is how many? . . .

We know that $\frac{1}{2}$ of 6 = 3 *because* $2 \times 3 = 6$.

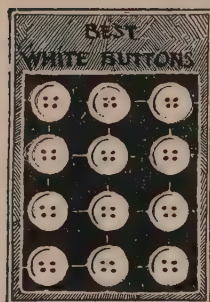
Also we know that $\frac{1}{3}$ of 9 = 3 *because* $3 \times 3 = 9$.

Read and supply the missing numbers:

- | | | | |
|----|-------------------------|-------------------------|-------------------------|
| 4. | $2 \times 2 = ?$ | $2 \times 3 = ?$ | $2 \times 4 = ?$ |
| | $\frac{1}{2}$ of 4 = ? | $\frac{1}{2}$ of 6 = ? | $\frac{1}{2}$ of 8 = ? |
| 5. | $2 \times 5 = ?$ | $2 \times 6 = ?$ | $2 \times 1 = ?$ |
| | $\frac{1}{2}$ of 10 = ? | $\frac{1}{2}$ of 12 = ? | $\frac{1}{2}$ of 2 = ? |
| 6. | $3 \times 2 = ?$ | $3 \times 3 = ?$ | $3 \times 4 = ?$ |
| | $\frac{1}{3}$ of 6 = ? | $\frac{1}{3}$ of 9 = ? | $\frac{1}{3}$ of 12 = ? |
| 7. | $4 \times 1 = ?$ | $4 \times 2 = ?$ | $4 \times 3 = ?$ |
| | $\frac{1}{4}$ of 4 = ? | $\frac{1}{4}$ of 8 = ? | $\frac{1}{4}$ of 12 = ? |

8. Tell number stories about halves, thirds and fourths.
9. Play the game on page 19, using cards with combinations like " $\frac{1}{2}$ of 6" and " $\frac{1}{3}$ of 9."

ORAL EXERCISES



1. How many buttons are there on this card?
2. How many buttons are there on one-half of the card?
3. One-half of 12 is how many?
4. Two 6's are how many?
This we write: $6+6=?$ or $2\times 6=?$
5. The card can be cut cross-wise into how many equal parts? What part of the whole card is each piece? How many buttons are there on each of these 4 pieces?
6. How many 3's are there in 12?
7. $\frac{1}{4}$ of 12 is how many?
8. Four 3's are how many? This we write $3+3+3+3=?$
or $4\times 3=?$
9. Three 4's are how many? This we write $4+4+4=?$
or $3\times 4=?$

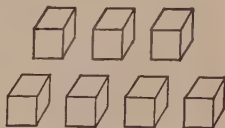
New Number Facts: $3\times 4=12$, $4\times 3=12$

10. The card can be cut lengthwise into 3 strips. How many buttons will there be on each strip?
11. How many 4's are there in 12?
12. $\frac{1}{3}$ of 12 is how many?
13. How many 2's are there in 12?
14. Count the buttons on this card by 2's, pointing to the buttons as you count.
15. Tell number stories about parts of 12.

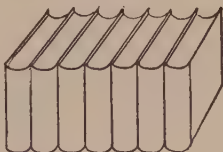
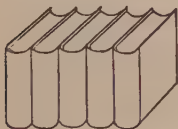
ORAL EXERCISES



1. 5 apples and 6 apples are how many apples?



2. 4 cubes and 7 cubes are how many cubes?



3. 5 books and 7 books are how many books?

4. Read the following and supply the missing numbers:

$$5+6=?$$

$$4+7=?$$

$$5+7=?$$

$$11-5=?$$

$$11-4=?$$

$$12-5=?$$

$$11-6=?$$

$$11-7=?$$

$$12-7=?$$

We know that $11-5=6$ *because* $6+5=11$.

5. How do you know that $11-6=5$? $11-4=7$? $11-7=4$?
6. John pays 6 cents for a tube of paste and 5 cents for a box of crayons. How much does he pay for both?
7. Mary pays 7 cents for a copy book and 5 cents for a box of crayons. How much does she pay for both?
8. Charles pays 4 cents for a blank book and 7 cents for a copy book. How much does he pay for both?

The following are all the addition combinations given thus far in this book:

1.	4 2 —	2 4 —	3 1 —	1 3 —	8 3 —	3 8 —	6 1 —	1 6 —	8 4 —	4 8 —
2.	9 1 —	1 9 —	7 5 —	5 7 —	6 6 —	3 3 —	2 3 —	3 2 —	2 1 —	1 2 —
3.	7 3 —	3 7 —	2 2 —	1 1 —	7 1 —	1 7 —	8 2 —	2 8 —	6 4 —	4 6 —
4.	5 3 —	3 5 —	5 2 —	2 5 —	5 1 —	1 5 —	6 2 —	2 6 —	4 3 —	3 4 —
5.	6 5 —	5 6 —	4 1 —	1 4 —	6 3 —	3 6 —	7 4 —	4 7 —	9 2 —	2 9 —
6.	8 1 —	1 8 —	7 2 —	2 7 —	4 4 —	5 4 —	4 5 —	9 3 —	3 9 —	5 5 —

Following are all except the simplest of these arranged in different order. See how fast you can give all the sums.

7.	4 2 —	9 1 —	7 3 —	5 3 —	6 5 —	1 8 —	2 4 —	2 9 —	3 7 —	3 5 —
8.	5 6 —	8 4 —	3 4 —	5 7 —	2 2 —	5 2 —	4 6 —	7 2 —	3 9 —	7 5 —
9.	1 9 —	2 5 —	4 3 —	2 7 —	8 3 —	6 6 —	8 1 —	1 5 —	6 3 —	4 4 —
10.	1 6 —	3 3 —	2 3 —	1 7 —	8 2 —	5 5 —	6 2 —	3 6 —	4 7 —	3 8 —
11.	5 4 —	9 3 —	4 5 —	9 2 —	7 4 —	2 6 —	2 8 —	3 2 —	6 4 —	4 8 —



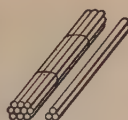
$$10+1=11$$

Eleven
11



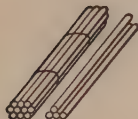
$$10+2=12$$

Twelve
12



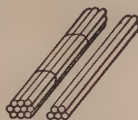
$$10+3=13$$

Thirteen
13



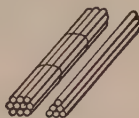
$$10+4=14$$

Fourteen
14



$$10+5=15$$

Fifteen
15



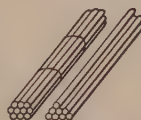
$$10+6=16$$

Sixteen
16



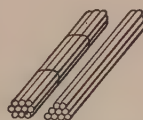
$$10+7=17$$

Seventeen
17



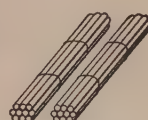
$$10+8=18$$

Eighteen
18



$$10+9=19$$

Nineteen
19



$$10+10=20$$

Twenty
20

Ten, written 10, means 1 *ten* and no *one*. 11 means 1 *ten* and 1 *one*. 12 means 1 *ten* and 2 *ones*.

ORAL EXERCISES

What is the meaning of each of the numbers:

13, 14, 15, 16, 17, 18, 19, 20?

WRITTEN EXERCISES

1. Write and read the numbers from 12 to 20.

2. Copy and add:

10	10	10	10	10	10	10	10	10
2	3	4	5	6	7	8	9	10
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>



ORAL EXERCISES

1. How many stripes are there on the flag?
2. How many white stripes are there on the flag?
3. How many red stripes are there on the flag?
4. 6 stripes and 7 stripes are how many stripes?
5. How many stripes must be added to 6 stripes to make 13 stripes?
6. How many stripes must be added to 7 stripes to make 13 stripes?
7. How many stripes are 8 stripes and 5 stripes? 9 stripes and 4 stripes?

New Number Facts

$$9 + 4 = 13$$

$$8 + 5 = 13$$

$$7 + 6 = 13$$

Subtract:

8.	13	13	13	13	13	13	13
	<u>4</u>	<u>5</u>	<u>9</u>	<u>6</u>	<u>4</u>	<u>3</u>	<u>8</u>

Find the missing numbers in the following:

- | | | | | |
|-----|--------------|--------------|---------------|--------------|
| 9. | $13 = 6 + ?$ | $13 = 7 + ?$ | $13 = 5 + ?$ | $13 = 8 + ?$ |
| 10. | $13 = 4 + ?$ | $13 = 9 + ?$ | $13 = 10 + ?$ | $13 = 3 + ?$ |
| 11. | $12 = 7 + ?$ | $12 = 5 + ?$ | $12 = 8 + ?$ | $12 = 4 + ?$ |
| 12. | $12 = 9 + ?$ | $12 = 3 + ?$ | $12 = 6 + ?$ | $12 = 2 + ?$ |



ORAL EXERCISES

- How many squares are there in this rectangle?
- Count to 20 by 2's. Each time that you count point to two squares.

Supply the missing numbers in the following. If you have trouble finding the numbers count squares in the figure at the top of this page.

- Two 2's are , three 2's are , four 2's are ,
 five 2's are , six 2's are , seven 2's are ,
 eight 2's are , nine 2's are , ten 2's are .

$$\begin{array}{lll}
 4. \quad 2 \times 2 = ? & 5 \times 2 = ? & 8 \times 2 = ? \\
 3 \times 2 = ? & 6 \times 2 = ? & 9 \times 2 = ? \\
 4 \times 2 = ? & 7 \times 2 = ? & 10 \times 2 = ?
 \end{array}$$

- From $:|:|:|:|:|:|:|:|:$ we see that $6 \times 2 = 2 \times 6$. In this manner show that $7 \times 2 = 2 \times 7$, $8 \times 2 = 2 \times 8$, and $9 \times 2 = 2 \times 9$.

- Give the products of 2×6 , 2×7 , 2×8 , 2×9 , 2×10 .

New Number Facts			
$7 \times 2 = 14$	$8 \times 2 = 16$	$9 \times 2 = 18$	$10 \times 2 = 20$
$2 \times 7 = 14$	$2 \times 8 = 16$	$2 \times 9 = 18$	$2 \times 10 = 20$

- Add:

2	3	4	5	6	7	8	9	10
2	3	4	5	6	7	8	9	10
—	—	—	—	—	—	—	—	—

From these sums find 2×2 , 2×3 , 2×4 , 2×5 , 2×6 , 2×7 , 2×8 , 2×9 , 2×10 .

ORAL EXERCISES

In 3×4 we say we **multiply** 4 by 3.

1. Multiply the numbers in the squares by the number in the circle.

3	4	2
6	2	9
5	7	8

We often write numbers to be multiplied, one above the other as in addition, and then say "multiply" or "find the product".

3
2
6

Multiply:

$$\begin{array}{r}
 2. \quad \begin{array}{r} 3 \ 2 \ 5 \ 2 \ 6 \ 2 \ 2 \ 1 \ 3 \\ 2 \ 3 \ 2 \ 5 \ 2 \ 6 \ 1 \ 2 \ 3 \\ \hline \end{array} \\
 3. \quad \begin{array}{r} 2 \ 7 \ 2 \ 9 \ 8 \ 2 \ 2 \ 4 \ 2 \\ 7 \ 2 \ 9 \ 2 \ 2 \ 8 \ 4 \ 2 \ 2 \\ \hline \end{array}
 \end{array}$$

4. Multiply the numbers outside the circle by 3. Go around the circle both ways. Also multiply each number

outside the circle by 2.

Read and supply the missing numbers:

- | | | | | |
|----|-------------------|-------------------|-------------------|-------------------|
| 5. | $10 = 5 \times ?$ | $10 = ? \times 5$ | $16 = 8 \times ?$ | $16 = ? \times 2$ |
| 6. | $12 = ? \times 6$ | $12 = ? \times 2$ | $18 = 9 \times ?$ | $18 = 2 \times ?$ |
| 7. | $14 = 7 \times ?$ | $14 = 2 \times ?$ | $8 = 4 \times ?$ | $8 = ? \times 2$ |
| 8. | $4 = ? \times 2$ | $6 = ? \times 2$ | $6 = 3 \times ?$ | $9 = ? \times 3$ |
| 9. | $12 = ? \times 3$ | $12 = 4 \times ?$ | $3 = 3 \times ?$ | $4 = 1 \times ?$ |

Learn each number fact of the tables *separately* so that you can give it instantly.

Play a game like the one on page 19, using number facts from the tables you have learned.

Review and Drill

You should now know all the number combinations on this page except those in the "New Number Facts" given below. Make marks or dots, or count sticks to show these new number facts.

New Number Facts		
$9+5=14$	$8+6=14$	$7+7=14$

ORAL EXERCISES

Add:

1.	9	5	8	6	7	3	9	9	4
	5	9	6	8	7	9	4	3	9
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
2.	9	8	3	7	3	2	6	4	7
	2	3	6	4	8	9	3	7	2
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
3.	7	4	5	5	6	5	7	3	2
	5	5	3	4	7	7	6	5	7
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
4.	8	6	8	5	4	5	7	8	3
	5	5	4	6	8	8	3	3	7
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Subtract:

5.	14	14	14	14	14	13	13	13
	9	5	8	6	7	4	7	6
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
6.	13	13	13	12	12	12	12	12
	8	5	9	6	7	5	8	4
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
7.	12	12	11	11	11	11	11	11
	9	3	6	5	7	4	8	3
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

8. Play the game on page 19.

ORAL AND WRITTEN EXERCISES

- How many tens and how many ones are there in each of these numbers: 14, 18, 11, 15, 19, 17, 13, 16, 12?
- Give the sums of the following:

10	10	10	10	10	10	10	10
<u>8</u>	<u>4</u>	<u>6</u>	<u>3</u>	<u>9</u>	<u>7</u>	<u>5</u>	<u>2</u>



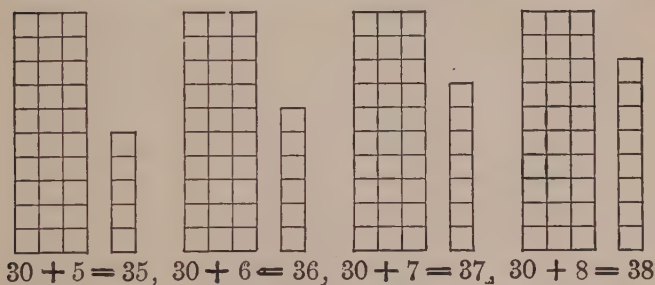
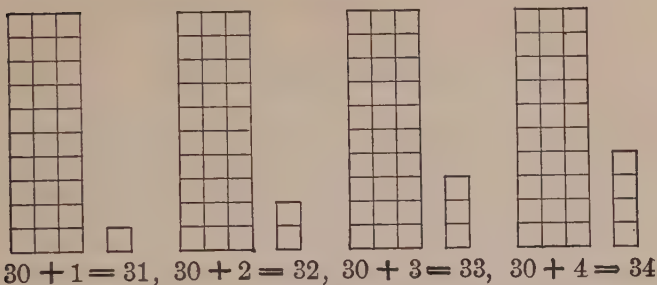
$$20 + 1 = 21, 20 + 2 = 22, 20 + 3 = 23, 20 + 4 = 24, 20 + 5 = 25$$



$$20 + 6 = 26, 20 + 7 = 27, 20 + 8 = 28, 20 + 9 = 29, 20 + 10 = 30$$

- Write all the numbers from 20 to 30 and read them.
- The number 24 means 2 *tens* and 4 *ones*. What does each of the following mean: 27, 23, 29, 21, 28, 22, 26, 25?
- Give the sums of the following:

20	20	20	20	20	20	20	20	20
<u>4</u>	<u>8</u>	<u>6</u>	<u>3</u>	<u>9</u>	<u>7</u>	<u>5</u>	<u>2</u>	<u>1</u>



ORAL EXERCISES

- Count from 30 to 40 and draw a figure like those above for the number 39. Write the numbers.
- Count from 40 to 50 and draw a figure for the number 47.
- 32 means 3 *tens* and 2 *ones*. What does each of the following mean? 35, 37, 33, 39, 31, 38, 36, 34?
- Add:

30	30	30	30	30	30	30	30
<u>4</u>	<u>8</u>	<u>6</u>	<u>3</u>	<u>9</u>	<u>7</u>	<u>5</u>	<u>2</u>
- 45 means 4 *tens* and 5 *ones*. What does each of the following mean: 44, 46, 48, 41, 42, 49, 43, 47?
- Add:

40	40	40	40	40	40	40	40
<u>2</u>	<u>5</u>	<u>7</u>	<u>9</u>	<u>3</u>	<u>6</u>	<u>8</u>	<u>4</u>

ORAL AND WRITTEN EXERCISES



1. How many marks are there in each group? Notice that there are four marks running the same way and one drawn across them. This is the usual way of "keeping tally." (See page 102.)
2. Make five groups of tally marks. Count to 25 by 5's.
3. How many marks are there in two groups? in 3 groups? in 4 groups? in 5 groups?

New Number Facts

$3 \times 5 = 15$

$4 \times 5 = 20$

$5 \times 5 = 25$

$5 \times 3 = 15$

$5 \times 4 = 20$

Copy and supply the missing numbers:

4. $2 \times 5 = ?$ $3 \times 5 = ?$ $4 \times 5 = ?$ $5 \times 5 = ?$
5. $2 \times ? = 10$ $? \times 5 = 10$ $3 \times ? = 15$ $? \times 5 = 15$
6. $4 \times ? = 20$ $? \times 5 = 20$ $5 \times ? = 25$ $? \times 5 = 25$

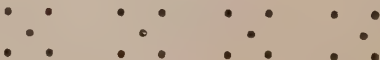
7. Find $\frac{1}{2}$ of 10.



8. Find $\frac{1}{3}$ of 15.



9. Find $\frac{1}{4}$ of 20.



10. Find $\frac{1}{5}$ of 25.



ORAL AND WRITTEN EXERCISES

Make 10 groups of tally marks with 5 marks in each, as shown on the opposite page.

1. How many marks are there in 6 groups of 5 each? In 7 groups? In 8 groups? In 9 groups? In 10 groups?

2. Count to 50 by 5's.

3. Copy and supply the missing numbers in $6 \times 5 = ?$
 $7 \times 5 = ?$ $8 \times 5 = ?$ $9 \times 5 = ?$ $10 \times 5 = ?$

4. How many 5's are there in 10? In 15? In 20? In 25?
 In 30? In 35? In 40? In 45? In 50?

5. Copy and supply the missing numbers in

$$6 \times ? = 30 \quad ? \times 5 = 30 \quad 7 \times ? = 35 \quad ? \times 5 = 35$$

$$8 \times ? = 40 \quad ? \times 5 = 40 \quad 9 \times ? = 45 \quad ? \times 5 = 45$$

$$10 \times ? = 50 \quad ? \times 5 = 50 \quad 5 \times ? = 25 \quad ? \times 5 = 20$$

6. Read and supply the missing numbers in

$$2 \times 5 = ? \quad 3 \times 5 = ? \quad 4 \times 5 = ? \quad 5 \times 5 = ?$$

$$3 \times ? = 15 \quad ? \times 5 = 20 \quad 5 \times ? = 25 \quad ? \times 5 = 10$$

$$4 \times ? = 20 \quad 2 \times ? = 10 \quad ? \times 5 = 25 \quad ? \times 5 = 15$$

New Number Facts

$$6 \times 5 = 30 \quad 7 \times 5 = 35 \quad 8 \times 5 = 40 \quad 9 \times 5 = 45$$

$$5 \times 6 = 30 \quad 5 \times 7 = 35 \quad 5 \times 8 = 40 \quad 5 \times 9 = 45$$

$$10 \times 5 = 50 \quad 5 \times 10 = 50$$

7. How many school days are there in 1 week? In 2 weeks?
 In 3 weeks? In 4 weeks? In 5 weeks?

8. How many fingers are there on two hands, counting the thumbs? On 4 hands? On 6 hands? On 8 hands?

9. Play a game like that on page 19, using combinations like 6×5 and 8×5 .



ORAL EXERCISES

Pieces of money like those shown in the picture are called coins.

1. How many cents are there in a nickel? In a dime?
2. How many cents are there in a quarter? In a half-dollar?
3. Count to 25 by 5's.
4. How many nickels equal a quarter?
5. Count to 50 by 5's. How many nickels equal a half-dollar?
6. Count to 50 by 10's. How many dimes equal a half-dollar?

5 cents = one nickel.
 10 cents = one dime.
 25 cents = one quarter.
 50 cents = a half-dollar.

5 nickels = one quarter.
 5 dimes = a half-dollar.
 10 dimes = one dollar.
 4 quarters = one dollar.

7. Count to 100 by 10's.
8. How many dimes equal a dollar?
9. How many nickels equal 15 cents? 25 cents? 20 cents?
 30 cents? 35 cents? 40 cents? 50 cents?

Play that the teacher or some child is a storekeeper, and that each child buys things. Use play money or cut out pieces of paper and mark them.

ORAL EXERCISES

1. Mary bought a bunch of lettuce for 7 cents and paid with a dime. What was her change?
2. Jane bought a loaf of stale bread for 4 cents and paid with a dime. What was her change?
3. John bought a loaf of fresh bread and used a dime to pay for it. How much did the bread cost if his change was 5 cents?
4. Harry bought a box of berries for 12 cents and gave the storekeeper 15 cents. What was his change?
5. Tell number stories about things you could buy at a store and the change you would get.
6. Tom bought a dozen bananas for 20 cents and a dozen oranges for 30 cents. How much did he pay for them?
7. Henry bought a dozen eggs for 35 cents and paid for them in nickels. How many nickels did he use?
8. What things could you buy at a real store for 10 cents? For 15 cents?
9. Tell what coins you could use to pay 35 cents at the store.
10. Tell what coins you could use to pay 43 cents at the store.
11. Tell number stories about buying things at a store and the coins you could use in paying for them.





ORAL EXERCISES

1. This farmer lived 6 miles from town. How far did he drive going to town and back again?
2. In town the farmer and his three children went

to see a ball game and paid 25 cents apiece to get in. How much did it cost them to see the game?



While they were gone the farmer's wife had prepared a surprise for John. The children of two neighbors had been invited for dinner.

3. How many places are set at the table? How many were needed by the farmer's family? How many neighbors' children were invited?
4. John thinks he will graduate from the grammar school when he is 14 years old. How many years has he still to be in grammar school? In what grade do you think he is?
5. Tell other stories about John's birthday.

ORAL EXERCISES

1. Make marks or count splints to find $8+7$.
2. In the same way find $9+6$, $9+7$, and $8+8$.

New Number Facts

$$8+7=15, 9+6=15, 9+7=16, 8+8=16.$$

Read the sums of the following. Notice that $7+0=7$, $6+0=6$, and so on.

3.	8	7	9	6	9	8	7	5	3	5
	7	8	6	9	5	5	0	9	8	8
	—	—	—	—	—	—	—	—	—	—
4.	7	7	5	6	7	0	8	6	0	2
	5	0	7	7	7	6	8	5	7	9
	—	—	—	—	—	—	—	—	—	—
5.	9	7	8	8	4	8	7	6	9	7
	7	9	0	3	7	6	6	8	0	3
	—	—	—	—	—	—	—	—	—	—
6.	8	9	4	0	9	0	9	4	7	5
	4	3	8	9	4	5	7	9	4	6
	—	—	—	—	—	—	—	—	—	—

Subtract:

7.	16	16	15	15	15	15	14	14
	9	7	8	7	9	6	9	5
	—	—	—	—	—	—	—	—
8.	14	14	13	13	13	13	13	13
	8	6	9	4	8	5	7	6
	—	—	—	—	—	—	—	—
9.	14	12	12	12	12	12	12	12
	7	6	8	3	5	7	4	9
	—	—	—	—	—	—	—	—

10. Play a game using the new number facts given on this page.

ORAL EXERCISES

1. How many inches are there in one foot? In 2 feet? In 3 feet? How many feet are there in one yard?
2. Do you think your desk is more or less than one foot wide? More or less than 2 feet wide? More or less than 3 feet wide? Measure to see whether your estimate is right.

Three feet = one **yard**. (3 ft. = 1 yd.)

Instead of yard or yards we often write yd.

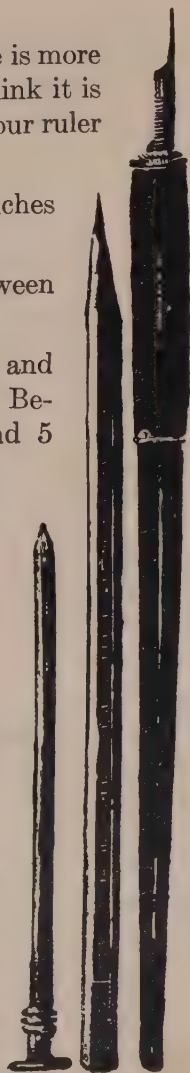
3. Estimate in feet the height of the teacher's desk. Make your estimate this way: "It is more than 2 feet and less than 3 feet." Then measure to see if you are right.
4. Estimate in feet the height from the floor to the lower edge of the blackboard. Also estimate the height of the blackboard from the lower to the upper edge.
5. How tall are you? Estimate in feet the height of your teacher.
6. Is the schoolroom more or less than 5 yards wide? 8 yards? 10 yards? 12 yards? 15 yards? Test by measuring.
7. Estimate the length of your schoolroom. Which is harder to estimate, the length or the width of the room?
8. Estimate the width of the teacher's desk, also the width of a chair and of a bookcase in the schoolroom.
9. Estimate the height and width in feet of the schoolroom door; also of a window in the schoolroom.
10. Play the game on page 27, using feet in estimating.

ORAL EXERCISES

1. Do you think the penholder in the picture is more or less than 4 inches long? Do you think it is more or less than 10 inches long? Use your ruler to find out.
2. Is the penholder more or less than 5 inches long? More or less than 6 inches?
3. Is it between 5 inches and 6 inches? Between 6 inches and 7 inches?
4. Is the length of the lead pencil between 2 and 7 inches? Between 6 and 7 inches? Between 4 and 6 inches? Between 4 and 5 inches?
5. Estimate the length of the nail. Try to estimate within an inch.
6. Estimate within an inch the length of a full line in this book.
7. Estimate within an inch the distance from the first line on this page to the last line.
8. Estimate within an inch the length and the width of the cover of this book.

Play the following game: Some of the children go to the board and each draws a line as nearly one foot long as he can. Then each one measures to see how nearly right he is. The child who is farthest from right must sit down, while someone else takes his place.

Play the same game, drawing a line 6 in. long, 2 ft. long, 18 in. long.



In Examples 1 to 4 below are contained all the multiplication facts learned thus far.

ORAL EXERCISES

Multiply:

1.	2	4	5	4	7	5	2	5	2	3
	4	2	4	5	5	7	5	2	2	3
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
2.	5	3	2	3	3	4	2	10	5	10
	3	5	3	2	4	3	10	2	10	5
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
3.	2	6	5	6	5	2	7	8	5	2
	6	2	6	5	5	7	2	5	8	1
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
4.	2	8	5	9	9	2	5	1	3	1
	8	2	9	5	2	9	1	4	1	1
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Practice on these until you can give each one instantly. If any of these cause you trouble write them down and practice on them till you know them well.

WRITTEN EXERCISES

1. Copy and supply the missing numbers:

$7 \times ? = 35$	$2 \times ? = 6$	$3 \times ? = 15$	$2 \times ? = 4$
$5 \times ? = 10$	$4 \times ? = 20$	$3 \times ? = 6$	$3 \times ? = 9$
$9 \times ? = 18$	$6 \times ? = 30$	$6 \times ? = 12$	$2 \times ? = 10$
$5 \times ? = 35$	$10 \times ? = 40$	$5 \times ? = 15$	$3 \times ? = 12$

2. Copy and supply the missing numbers:

$? \times 5 = 25$	$? \times 2 = 16$	$? \times 5 = 10$	$? \times 3 = 9$
$? \times 2 = 4$	$? \times 5 = 15$	$? \times 2 = 6$	$? \times 2 = 12$
$? \times 5 = 30$	$? \times 5 = 45$	$? \times 2 = 8$	$? \times 2 = 14$
$? \times 5 = 40$	$? \times 5 = 20$	$? \times 3 = 6$	$? \times 5 = 35$

Play a number game like the one on page 19, using number combinations like those above.



ORAL EXERCISES

1. How many children are there in this party?
2. Mary brought 2 sandwiches for each of the 8 people of the party. How many did she bring?
3. They cut the cake into 12 pieces and each ate one piece. How many pieces were left?
4. Jane bought 8 oranges at 5 cents apiece. How much did she pay for them?
5. One lemon made enough lemonade for 2 persons. How many lemons were needed for the party?
6. At two lemons for 3 cents, how much did 4 lemons cost?
7. The girls started for their picnic at 3 o'clock and returned at 7 o'clock. How many hours were they gone?
8. Going out they rode 4 miles on the street car and then walked 1 mile. How many miles from home was the picnic? How many miles did they ride on the car going and coming? How many miles did they walk?
9. If the fare one way was 5 cents, how much carfare did each one pay? How much carfare did they all pay?

Twelve of anything is called a **dozen**.



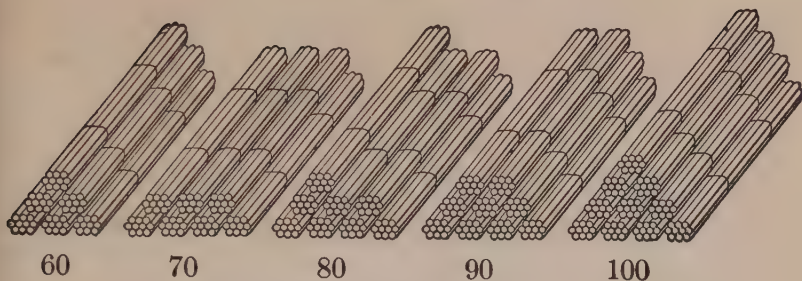
ORAL EXERCISES

1. How many inches are there in one foot? Is this more or less than a dozen?
2. How many cents are there in a dime? Is this more or less than a dozen? How much?
3. How many stripes are there on the U. S. flag? Is this more or less than a dozen? How much?
4. If your mother buys a half-dozen eggs, how many eggs does she buy?
5. There are a dozen buttons on a card. If your mother uses half of them, how many are left?
6. How many are there in $\frac{1}{3}$ of a dozen? In $\frac{1}{4}$ of a dozen?
7. Which is more, $\frac{1}{2}$ of a dozen or $\frac{1}{3}$ of a dozen? $\frac{1}{3}$ of a dozen or $\frac{1}{4}$ of a dozen?
8. Can you divide 12 into 6 equal groups? How many are there in each group?

One of the six equal parts of anything is called **one-sixth** of the thing.

One-sixth is written $\frac{1}{6}$ or $\frac{1}{6}$.

9. How many are there in $\frac{1}{6}$ of 12? Is this more or less than $\frac{1}{4}$ of 12? How much?

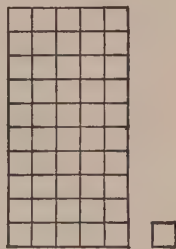


ORAL AND WRITTEN EXERCISES

1. Count to 100 by 10's.
2. Count from 50 to 60 and draw a figure for the number 58.
Write the numbers. (See figure below.)
3. The number 52 means 2 *ones* and 5 *tens*. Tell what each of these numbers means: 53, 54, 55, 56, 57, 58, 59.
In numbers like these the first figure to the right stands for *ones* and the next figure stands for *tens*.

The first place to the right is called **one's place**, and the second is called **ten's place**.

Since 0 means **not any**, 50 stands for 5 tens and no ones.



$$50 + 1 = 51$$

4. Count from 60 to 70 and write the numbers.
5. Count from 70 to 80 and write the numbers.
6. Count from 80 to 90 and write the numbers.
7. Count from 90 to 100 and write the numbers.
8. How many tens are there in 60? In 70? In 80? In 90?
In 100? How many ones are there in each of these?
9. Count from 50 to 100 by 5's.



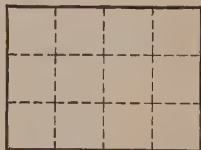
Take a paper 3 inches square and fold it as shown in this figure.

ORAL EXERCISES

1. How many 3's are there in 9?
2. Show $\frac{1}{3}$ of 9. $\frac{1}{3}$ of 9 is how many?

Notice that if there are three 3's in 9, then $\frac{1}{3}$ of 9 must be 3. Hence, from $3 \times 3 = 9$ we know that $\frac{1}{3}$ of 9 = 3.

Take a paper 3 inches by 4 inches and fold it as shown in this figure.



3. How many 3's are there in 12?
Show $\frac{1}{4}$ of 12.
4. How many 4's are there in 12?
Show $\frac{1}{3}$ of 12.

From $3 \times 4 = 12$ we know that there are three 4's in 12, and also that there are four 3's in 12. We also know from $3 \times 4 = 12$ that $\frac{1}{3}$ of 12 = 4, and $\frac{1}{4}$ of 12 = 3. Understanding this will save you a lot of trouble in arithmetic.

WRITTEN EXERCISES

1. Copy the following and supply the missing numbers:

$2 \times 3 = ?$	$3 \times 4 = ?$	$3 \times 5 = ?$
$\frac{1}{2}$ of 6 = ?	$\frac{1}{3}$ of 12 = ?	$\frac{1}{3}$ of 15 = ?
$\frac{1}{3}$ of 6 = ?	$\frac{1}{4}$ of 12 = ?	$\frac{1}{5}$ of 15 = ?
$2 \times 4 = ?$	$2 \times 5 = ?$	$2 \times 6 = ?$
$\frac{1}{2}$ of 8 = ?	$\frac{1}{2}$ of 10 = ?	$\frac{1}{2}$ of 12 = ?
$\frac{1}{4}$ of 8 = ?	$\frac{1}{5}$ of 10 = ?	$\frac{1}{6}$ of 12 = ?

2. 1 is $\frac{1}{2}$ of ? 1 is $\frac{1}{3}$ of ? 1 is $\frac{1}{4}$ of ? 1 is $\frac{1}{5}$ of ?
3. 2 is $\frac{1}{2}$ of ? 2 is $\frac{1}{3}$ of ? 2 is $\frac{1}{4}$ of ? 2 is $\frac{1}{5}$ of ?
4. 3 is $\frac{1}{2}$ of ? 3 is $\frac{1}{3}$ of ? 3 is $\frac{1}{4}$ of ? 3 is $\frac{1}{5}$ of ?
5. 4 is $\frac{1}{2}$ of ? 4 is $\frac{1}{3}$ of ? 5 is $\frac{1}{2}$ of ? 5 is $\frac{1}{3}$ of ?

You found on page 52 that one-third of 9 equals 3. Hence two-thirds of 9 equal 6.

ORAL EXERCISES

1. In the first figure on page 52 show two-thirds of 9.
2. In the second figure on page 52 show two-thirds of 12.
3. Two-fourths of 12 are how many? Is this more or less than $\frac{1}{2}$ of 12?
4. Show three-fourths of 12.

Two-thirds is written $\frac{2}{3}$ or $\frac{2}{3}$.
 Three-fourths is written $\frac{3}{4}$ or $\frac{3}{4}$.

5. $\frac{3}{4}$ of 12 are how many?

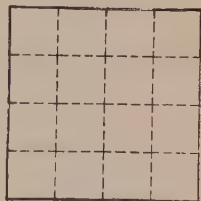
FOLDING PAPER AND DRAWING FIGURES

Fold a piece of paper as shown in the figure.

1. Four 4's are how many?

This we write $4 \times 4 = 16$.

2. One-fourth of 16 is how many?
3. Two-fourths of 16 are how many?
4. $\frac{1}{2}$ of 16 is how many? Which is more, $\frac{1}{2}$ of 16 or $\frac{1}{4}$ of 16?



5. Supply the missing numbers in $\frac{1}{2}$ of 16 = ?; $\frac{1}{4}$ of 16 = ?; $4 \times 4 = ?$.
6. Draw a figure 5 inches long and 3 inches wide and divide it into square inches. How many square inches are there in the figure?
7. $\frac{1}{3}$ of 15 is how many? $\frac{1}{5}$ of 15 is how many? In your figure show $\frac{2}{3}$ of 15; also $\frac{2}{5}$ of 15; $\frac{3}{5}$ of 15; $\frac{4}{5}$ of 15.
8. Play a game finding parts of numbers.

ORAL EXERCISES

1. Find the sum of 8 and 9 and of 9 and 9.

All the combinations given below have been studied before except $9+8$ and $9+9$.

New Num-
ber Facts

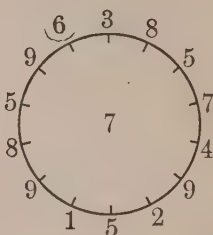
$$9+8=17$$

$$9+9=18$$

Read rapidly, giving the sums:

2.	3	4	5	6	7	8	9	3	4	5
	5	5	3	5	3	3	2	7	7	4
	—	—	—	—	—	—	—	—	—	—
3.	6	7	8	9	3	4	5	6	7	8
	7	4	4	3	8	8	6	8	5	5
	—	—	—	—	—	—	—	—	—	—
4.	9	3	5	6	7	8	9	5	7	8
	4	9	7	9	6	6	5	8	7	7
	—	—	—	—	—	—	—	—	—	—
5.	9	5	7	8	9	7	8	9	9	4
	6	9	8	8	7	9	9	8	9	9
	—	—	—	—	—	—	—	—	—	—

6. In each of these circles add the numbers outside it to the number within it. See how rapidly you can go around each circle.



7. Play the number game on page 19, adding numbers.
8. Give the sums in exercises 2 to 5 again. Make a list of those that cause you trouble, and practice on them till you know them well.

ORAL EXERCISES

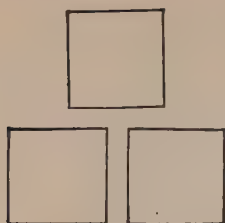
1. Harry and Jennie live 7 blocks from school. How many blocks do they walk going to school and back?
2. They start from home 15 minutes before the last bell rings. It takes them 10 minutes to walk to school. How many minutes have they to spare?
3. School closes at 12 o'clock. At what time do they get home for lunch, if they walk the distance in 10 minutes?
4. On rainy days they ride on the street car. Each pays 5 cents car-fare. How much money do they need for car-fare if they ride both ways?



They can buy things to eat at the school cafeteria at these prices:

Cream of wheat and milk	3¢
Soup	2¢
Glass of milk	3¢
Bread and butter	2¢
Sandwich	3¢
Cookies	1¢
Stewed fruit	2¢

5. Plan some lunches for them and tell what these lunches would cost.
6. If Jennie spent 7 cents for lunch, how much money did she spend for lunch and car-fare together?
7. Tell number stories about buying lunch at school.



ORAL EXERCISES

1. Make a figure like this with sticks.
How many sticks do you need to make it? What do you call this figure?
2. How many sticks do you need to make two squares if they do not touch each other?
3. Count to 24 by 4's, also by 2's. Does counting by 2's help you to count by 4's? How?
4. Two 4's are how many?
5. Three 4's are how many? 
6. Four 4's are how many? 
7. Five 4's are how many? 
8. Six 4's are how many? Draw six squares and count the sides.

New Number Facts

$4 \times 4 = 16$

$6 \times 4 = 24$

$4 \times 6 = 24$

Learn the new number facts separately so that you can state each one instantly.

WRITTEN EXERCISES

Copy and supply the missing numbers:

$2 \times 4 = ?$

$3 \times 4 = ?$

$5 \times 4 = ?$

$6 \times 4 = ?$

$4 \times 2 = ?$

$4 \times 3 = ?$

$4 \times 5 = ?$

$4 \times 6 = ?$

$\frac{1}{2} \text{ of } 8 = ?$

$\frac{1}{3} \text{ of } 12 = ?$

$\frac{1}{5} \text{ of } 20 = ?$

$\frac{1}{4} \text{ of } 24 = ?$

$\frac{1}{4} \text{ of } 8 = ?$

$\frac{1}{4} \text{ of } 12 = ?$

$\frac{1}{4} \text{ of } 2 = ?$

$\frac{1}{6} \text{ of } 24 = ?$

ORAL EXERCISES

1. Have you seen quart bottles of milk? Pint bottles?
Which holds more, a quart bottle or a pint bottle?
2. Find out how much one quart of milk costs. At this price, how much will 2 quarts cost?
3. Find out how much one pint of cream costs. Which costs more, a quart of milk or a pint of cream?
How much more?



If you can get a quart and a pint measure and some sand, sawdust or beans you can easily find out how many pints there are in a quart by filling the pint measure and pouring it into the quart measure.



4. How many pints are there in one quart? One pint is what part of a quart?
5. How many pints are there in 2 quarts? In 4 quarts? In 6 quarts?
6. How many quart measures may be filled from 8 pint measures? From 10 pint measures?

2 pints = 1 quart (2 pt. = 1 qt.).
One pint is enough to fill two glasses.

We sometimes write pt. for pint or pints and qt. for quart or quarts.

7. How many glasses can be filled from one quart bottle?
From 2 quart bottles? From 3 quart bottles?

In subtracting 7 from 12 we say either "12 less 7 is 5" or " $12 = 7 + 5$ ", and write 5 below the line. Your teacher will choose one of these ways for you, and then you must always subtract that way.

12
7
5

ORAL EXERCISES

Subtract:

1.	17 9 —	17 8 —	18 9 —	16 8 —	16 9 —	16 7 —	15 9 —	15 6 —
2.	15 8 —	15 7 —	14 9 —	14 5 —	14 8 —	14 6 —	14 7 —	12 6 —
3.	13 9 —	13 4 —	13 8 —	13 5 —	13 7 —	13 6 —	12 7 —	12 5 —
4.	12 9 —	12 8 —	11 7 —	11 9 —	11 4 —	11 3 —	11 5 —	11 6 —

WRITTEN EXERCISES

Copy and add. Check as on page 58.

1.	3 4 5 —	2 3 4 —	6 2 3 —	5 4 3 —	4 4 5 —	3 3 6 —	5 4 5 —	2 6 3 —	3 6 2 —	3 5 4 —
2.	4 5 3 —	7 2 6 —	6 3 5 —	5 4 4 —	3 4 5 —	4 4 3 —	2 4 5 —	7 1 8 —	8 1 5 —	8 1 6 —
3.	7 2 5 —	7 2 7 —	5 1 8 —	6 1 5 —	4 2 6 —	5 2 4 —	6 2 6 —	4 4 5 —	4 3 5 —	3 6 3 —
4.	4 5 4 —	5 2 7 —	4 3 6 —	6 3 6 —	5 4 2 —	4 5 3 —	8 6 0 —	0 5 9 —	6 3 5 —	5 0 8 —

ORAL EXERCISES

1. Name the days of the week. Which is the first day and which is the last?
2. How many days are there in a week?
3. How many days do you go to school each week?
4. How many days are there in two weeks?
5. How many days do you go to school in 2 weeks? In 3 weeks? In 4 weeks?
6. How many days does John's father work each week?

7 days = 1 week. (7 da. = 1 wk.)

We sometimes write da. for day or days, and wk. for week or weeks.

7. How many days does John's father work in two weeks?
How can you find how many days he works in 3 weeks?

Read rapidly the sums of the following:

[illegible]

Subtract the following:

10.	14	15	13	16	14	15	15	13
	<u>5</u>	<u>7</u>	<u>6</u>	<u>9</u>	<u>6</u>	<u>8</u>	<u>9</u>	<u>7</u>
11.	15	17	16	16	18	17	14	14
	<u>6</u>	<u>9</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>8</u>	<u>8</u>	<u>9</u>
12.	14	12	13	14	12	13	14	13
	<u>5</u>	<u>8</u>	<u>4</u>	<u>6</u>	<u>7</u>	<u>5</u>	<u>7</u>	<u>8</u>

ORAL EXERCISES

1. Read and supply the missing numbers:

$$2 \times 3 = ? \quad 3 \times 3 = ? \quad 4 \times 3 = ?$$

2. Make a figure like this with sticks.

How many sticks do you use to make it? What do you call the figure?



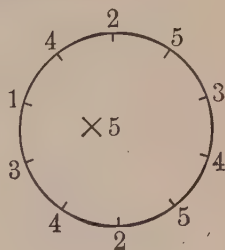
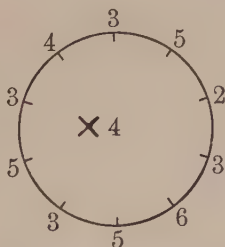
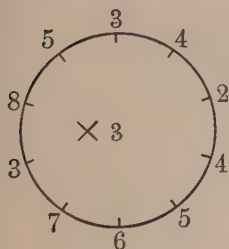
3. How many sticks do you need to make two triangles if they do not touch each other? How many do you need



to make three triangles? Four triangles? Five triangles? Six triangles? Seven triangles? Eight triangles?

4. Five 3's make how many? Six 3's? Seven 3's? Eight 3's?

See how rapidly you can go around these circles.



WRITTEN EXERCISES

Copy and supply the missing numbers in the following:

$$6 \times 3 = ? \quad 7 \times 3 = ? \quad 8 \times 3 = ?$$

$$\frac{1}{6} \text{ of } 18 = ? \quad \frac{1}{7} \text{ of } 21 = ? \quad \frac{1}{8} \text{ of } 24 = ?$$

$$\frac{1}{3} \text{ of } 18 = ? \quad \frac{1}{3} \text{ of } 21 = ? \quad \frac{1}{3} \text{ of } 24 = ?$$

New Number Facts

$$6 \times 3 = 18 \quad 7 \times 3 = 21 \quad 8 \times 3 = 24$$

$$3 \times 6 = 18 \quad 3 \times 7 = 21 \quad 3 \times 8 = 24$$



1. What do the letters on the face of this clock mean? Ask the teacher if you are right. Such letters, when used for numbers, are called Roman numerals.
2. Write the Roman numerals I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII.

I means 1	V means 5	IX means 9
II means 2	VI means 6	X means 10
III means 3	VII means 7	XI means 11
IV means 4	VIII means 8	XII means 12

On the clock IIII is often used instead of IV.

3. Where else have you seen V used for 5, and X for 10?
4. What are the small spaces on the clock called? If you do not know ask the teacher or someone else to tell you.
5. How many minute spaces are there between the numbers I and II? Between II and III? Between III and IV? Between XII and IV?

Make a toy clock face and fasten hands on it with a pin. The long hand of the clock is the *minute hand*; the short hand is the *hour hand*.

PROBLEMS

1. Set the clock so that it shall read 12 o'clock. If you have trouble the teacher or some one at home will help you set your clock.
2. At what time do you leave home for school in the morning? Set the toy clock so that it will show the time at which you leave home.
3. Set the clock to show the time at which you came to the school-house this morning.
4. Set the clock to show the time at which school is called to order in the morning.
5. When do you have your first recess? Set your clock to show that time.
6. Set your clock to show the time when school is out in the afternoon.
7. How many minutes are there in one hour?
8. How many minutes are there in half an hour? In a quarter of an hour?
9. How many minutes does it take you to go to school in the morning?
10. How long does it take you to brush your teeth well? To wash your face and hands? To put on your shoes?
11. How many minute spaces are there between XII and VI? Count to 30 by 5's.
12. How many minute spaces are there all around the face of the clock? Count them. Count to 60 by 5's.



ORAL EXERCISES

1. How many children can you see riding on this merry-go-round?
2. These children pay five cents for each ride. How much do 7 children pay?
3. The children standing with their father are going to ride next. How much will the father have to pay for the three children? What change will he get from a quarter?
4. How much is paid for 5 rides? For 6 rides? For 7 rides? For 8 rides? For 9 rides?
5. How many children can ride for 25 cents? For 30 cents? For 35 cents? For 40 cents? For 45 cents? For 50 cents? For 20 cents? For 15 cents?
6. A man pays for 4 rides for his children. What change will he get from a quarter?
7. A lady pays for 8 rides for some children. What change does she get from a half-dollar?

ORAL EXERCISES

Read and supply the missing numbers:

1.	$2 \times 5 = ?$	$\frac{1}{2}$ of 10 = ?	$6 \times 5 = ?$	$\frac{1}{6}$ of 30 = ?
	$3 \times 5 = ?$	$\frac{1}{3}$ of 15 = ?	$7 \times 5 = ?$	$\frac{1}{7}$ of 35 = ?
	$4 \times 5 = ?$	$\frac{1}{4}$ of 20 = ?	$8 \times 5 = ?$	$\frac{1}{8}$ of 40 = ?
	$5 \times 5 = ?$	$\frac{1}{5}$ of 25 = ?	$9 \times 5 = ?$	$\frac{1}{9}$ of 45 = ?

Subtract:

2.	8	6	6	7	7	9	9	8	10	9
	3	4	2	2	5	4	6	2	6	5
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
3.	18	17	17	16	16	16	15	15	15	15
	9	8	9	7	9	8	6	9	9	8
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
4.	14	13	15	14	13	13	12	12	12	11
	6	8	8	8	7	9	7	9	9	7
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
5.	11	9	8	11	12	11	12	9	11	11
	9	7	5	5	5	8	8	5	3	3
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>

WRITTEN EXERCISES

Copy and add:

1.	3	4	6	7	3	5	5	4	5	2	5
	2	2	3	2	5	4	2	3	0	3	3
	7	6	5	5	4	5	7	6	9	4	2
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
2.	3	0	2	5	5	4	2	0	3	8	6
	4	9	7	2	4	4	3	7	2	7	3
	5	4	1	3	2	5	4	3	1	0	5
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
3.	5	7	6	7	4	7	8	2	3	8	5
	3	2	3	0	2	2	0	5	4	0	4
	4	5	6	9	3	2	9	3	3	9	3
	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>



ORAL EXERCISES

1. How many people are drinking lemonade?
2. These girls get 5 cents a glass for the lemonade. How much do they get for 4 glasses? What change do the girls give for a quarter?
3. How many glasses of lemonade would these girls sell for a dime? For 2 dimes? For 3 dimes? For 4 dimes? For 5 dimes? For 6 dimes? For 7 dimes? For 8 dimes? For 9 dimes? For 10 dimes?
4. What is the cost of 5 glasses of lemonade? Of 6 glasses? Of 7 glasses? Of 8 glasses? Of 9 glasses? Of 10 glasses?
5. How much will the girls get for 20 glasses of lemonade? How many 5's are there in 100? Count to 100 by 5's.
6. How many glasses of lemonade would these girls have to sell to get a quarter? A half-dollar? A dollar?
7. If the girls sell three glasses of lemonade what change do they give for a quarter?

The girls bought the lemons for the lemonade, and one girl's mother gave them the sugar.

Two lemons cost 5 cents.
One lemon makes 2 glasses of lemonade.

ORAL EXERCISES

1. How much would the girls pay for 4 lemons? For 6 lemons? For 8 lemons?
2. How many glasses of lemonade do they get from 2 lemons? From 3 lemons? From 4 lemons? From 6 lemons? From 8 lemons?
3. How much does it cost the girls to make 4 glasses? 8 glasses? 12 glasses?
4. How much more did the girls get for 4 glasses of lemonade than it cost them?
5. Tell number stories about selling lemonade.

WRITTEN EXERCISES

Copy and subtract:

6.	$\begin{array}{r} 14 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 9 \\ \hline \end{array}$
7.	$\begin{array}{r} 14 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 8 \\ \hline \end{array}$
8.	$\begin{array}{r} 11 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 5 \\ \hline \end{array}$
9.	$\begin{array}{r} 12 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 8 \\ \hline \end{array}$

Play a game, using examples in subtraction.

9 : 00- 9 : 10	Opening Exercises	1 : 30-1 : 45	Music
9 : 10- 9 : 25	Language	1 : 45-2 : 00	Writing
9 : 25- 9 : 35	Phonetics	2 : 00-2 : 20	Seatwork
9 : 35- 9 : 55	Seatwork	2 : 20-2 : 30	Spelling
9 : 55-10 : 05	Physical Exercises	3 : 30-2 : 45	Recess
10 : 05-10 : 25	Reading	2 : 45-3 : 00	Reading
10 : 25-10 : 45	Recess	3 : 00-3 : 20	Drawing and
10 : 45-10 : 55	Story		Handwork
10 : 55-11 : 10	Number	3 : 20-3 : 30	Games and
11 : 10-11 : 30	Seatwork		Songs.

ORAL EXERCISES

1. Set your toy clock face (see page 63) to show each hour given in this program.

We write 9:00 for nine o'clock, 9:10 for ten minutes past nine, 9:45 for forty-five minutes past nine, and so on. 9:45 is also read "a quarter to ten." 9:50 is usually read "ten minutes to ten," and 9:55 is usually read "five minutes to ten." Sometimes 9.00, 9.10 are written for 9:00, 9:10. Either form may be used.

2. Read this program. What time of day is 10:58?
3. How many minutes are spent on language in this program?
4. How many minutes are spent for recess?
5. How many minutes are given to reading in the morning?
6. How many minutes are spent on spelling?
7. Set your toy clock to show each hour named in your school program.
8. Write the following by means of figures: twenty-five minutes past ten; half-past ten; five minutes to eleven (this is fifty-five minutes past ten).

ORAL EXERCISES

3 9 —	7 4 —	5 6 —	9 9 —	9 2 —	8 7 —	9 5 —	4 5 —	6 3 —	8 5 —
5 7 —	9 6 —	2 5 —	5 9 —	6 4 —	3 8 —	7 2 —	7 4 —	8 9 —	7 7 —
9 8 —	9 4 —	4 7 —	4 3 —	6 8 —	9 3 —	7 8 —	2 8 —	6 2 —	3 6 —
8 9 —	5 7 —	6 5 —	8 7 —	7 6 —	2 7 —	3 4 —	7 8 —	3 2 —	5 4 —
8 5 —	4 6 —	9 4 —	6 8 —	9 8 —	6 9 —	9 5 —	4 8 —	5 2 —	7 3 —
2 9 —	9 4 —	7 9 —	7 5 —	6 8 —	8 4 —	2 4 —	5 4 —	7 5 —	8 9 —
6 6 —	2 8 —	8 3 —	3 9 —	9 6 —	4 9 —	7 6 —	8 7 —	7 9 —	5 3 —
9 7 —	5 9 —	6 9 —	5 8 —	3 5 —	7 9 —	6 7 —	8 3 —	3 7 —	5 8 —
9 8 —	6 9 —	8 6 —	4 8 —	7 6 —	2 7 —	5 9 —	9 7 —	8 8 —	6 5 —
5 4 3 —	7 2 6 —	9 0 7 —	3 6 5 —	2 7 4 —	3 5 4 —	1 7 2 —	4 2 7 —	5 0 9 —	0 8 7 —

ORAL EXERCISES

Give the products of the following:

3	4	6	7	8	2	9	2	2	6
5	3	2	5	3	4	2	3	5	4
—	—	—	—	—	—	—	—	—	—
6	5	8	5	8	4	3	3	3	5
5	2	5	3	2	4	3	2	3	4
—	—	—	—	—	—	—	—	—	—
9	4	10	5	10	7	6	3	4	5
5	2	2	5	5	2	5	1	1	1
—	—	—	—	—	—	—	—	—	—

Give the missing numbers in the following:

$\frac{1}{2}$ of 4 = ?	$\frac{1}{5}$ of 10 = ?	$\frac{1}{4}$ of 8 = ?	$\frac{1}{2}$ of 14 = ?
$\frac{1}{7}$ of 14 = ?	$\frac{1}{5}$ of 15 = ?	$\frac{1}{3}$ of 12 = ?	$\frac{1}{3}$ of 21 = ?
$\frac{1}{4}$ of 12 = ?	$\frac{1}{6}$ of 30 = ?	$\frac{1}{2}$ of 10 = ?	$\frac{1}{4}$ of 20 = ?
$\frac{1}{5}$ of 20 = ?	$\frac{1}{7}$ of 21 = ?	$\frac{1}{6}$ of 12 = ?	$\frac{1}{5}$ of 40 = ?
$\frac{1}{6}$ of 24 = ?	$\frac{1}{10}$ of 20 = ?	$\frac{1}{3}$ of 15 = ?	$\frac{1}{5}$ of 45 = ?
$\frac{1}{5}$ of 15 = ?	$\frac{1}{4}$ of 8 = ?	$\frac{1}{4}$ of 12 = ?	$\frac{1}{4}$ of 24 = ?
$\frac{1}{8}$ of 16 = ?	$\frac{1}{5}$ of 10 = ?	$\frac{1}{5}$ of 30 = ?	$\frac{1}{3}$ of 24 = ?
$\frac{1}{3}$ of 6 = ?	$\frac{1}{3}$ of 9 = ?	$\frac{1}{5}$ of 35 = ?	$\frac{1}{2}$ of 16 = ?
$\frac{1}{2}$ of 6 = ?	$\frac{1}{8}$ of 24 = ?	$\frac{1}{4}$ of 16 = ?	$\frac{1}{2}$ of 18 = ?
$\frac{1}{9}$ of 18 = ?	$\frac{1}{5}$ of 20 = ?	$\frac{1}{3}$ of 18 = ?	$\frac{1}{5}$ of 50 = ?
$\frac{1}{6}$ of 18 = ?	$\frac{1}{5}$ of 25 = ?	$\frac{1}{2}$ of 12 = ?	$\frac{1}{2}$ of 20 = ?

1 nickel = ? cents
 1 dime = ? cents
 1 quarter = ? cents
 1 half-dollar = ? cents
 1 dollar = ? cents
 1 quarter = ? nickels
 1 half-dollar = ? nickels
 1 half-dollar = ? dimes
 1 dollar = ? dimes

1 foot = ? inches
 1 yard = ? feet

1 quart = ? pints

1 week = ? days
 1 hour = ? minutes

CHAPTER II

A NUMBER GAME

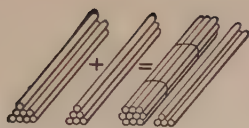


These children are playing a number game. Each child has pencil and paper. The teacher reads number combinations like $7+8=?$ and $6+5=?$. The children write the sums. When the teacher has finished reading, the children exchange papers and the teacher reads the answers. The pupils mark the wrong answers and then count the wrong answers and those not given. One side of the room plays against the other side. The side which has the fewer mistakes wins. The girls may also play against the boys.

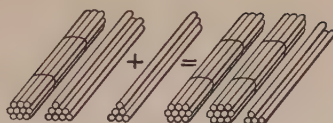
ORAL EXERCISES

Read rapidly and supply the missing numbers:

- | | | | |
|------------|---------|---------|---------|
| 1. $9+8=?$ | $7+8=?$ | $9+7=?$ | $9+6=?$ |
| 2. $7+6=?$ | $8+5=?$ | $8+6=?$ | $6+5=?$ |
| 3. $6+9=?$ | $7+9=?$ | $8+7=?$ | $8+9=?$ |
| 4. $5+6=?$ | $6+8=?$ | $5+8=?$ | $6+7=?$ |



$$8 + 6 = 14$$



$$18 + 6 = 24$$

WRITTEN EXERCISES

Arrange splints or toothpicks as above or make marks to show the sums of the following:

[illegible]

Copy the numbers below and add. If you have trouble in finding the sums, use splints or make marks.

$$\begin{array}{cccccc} \mathbf{2.} & 9 & 19 & 9 & 19 & 9 & 19 & 9 & 19 & 9 & 19 \\ & 7 & 7 & 6 & 6 & 9 & 9 & 8 & 8 & 3 & 3 \\ & \hline & \hline \end{array}$$

3. $\frac{8}{8} \frac{18}{8} \frac{8}{5} \frac{18}{5} \frac{8}{9} \frac{18}{9} \frac{8}{7} \frac{18}{7} \frac{4}{9} \frac{14}{9}$

$$4. \quad \begin{array}{r} 7 \ 17 \\ 9 \ 9 \\ \hline \end{array} \quad \begin{array}{r} 7 \ 17 \\ 8 \ 8 \\ \hline \end{array} \quad \begin{array}{r} 7 \ 17 \\ 7 \ 7 \\ \hline \end{array} \quad \begin{array}{r} 7 \ 17 \\ 6 \ 6 \\ \hline \end{array} \quad \begin{array}{r} 5 \ 15 \\ 9 \ 9 \\ \hline \end{array}$$

ORAL EXERCISES

Add:

I.	6	16	6	16	6	16	6	16
	9	9	8	8	7	7	5	5
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

$$\begin{array}{cccccccc} \mathbf{2.} & 5 & 15 & 8 & 18 & 5 & 15 & 5 & 15 & 9 & 19 \\ & 9 & 9 & 6 & 6 & 8 & 8 & 6 & 6 & 2 & 2 \\ & \hline & \hline \end{array}$$

3. $\frac{2}{9} \frac{12}{9} \frac{8}{3} \frac{18}{3} \frac{7}{4} \frac{17}{4} \frac{3}{8} \frac{13}{8} \frac{4}{7} \frac{14}{7}$

ORAL EXERCISES

- 1.** Add 2 to each number in the following table:

0	10	20	30	40	50	60	70	80	90
1	11	21	31	41	51	61	71	81	91
2	12	22	32	42	52	62	72	82	92
3	13	23	33	43	53	63	73	83	93
4	14	24	34	44	54	64	74	84	94
5	15	25	35	45	55	65	75	85	95
6	16	26	36	46	56	66	76	86	96
7	17	27	37	47	57	67	77	87	97
8	18	28	38	48	58	68	78	88	98
9	19	29	39	49	59	69	79	89	99

2. Count to 100 by 2's beginning with 0. Point to the numbers in the above table.
3. Count to 99 by 2's beginning with 1. Point to the numbers. To which lines do you point?
4. Count to 100 by 5's beginning with 5. Point to the numbers in the table? To which lines do you point?
5. Count to 100 by 10's beginning with 0. Count to 95 by 10's beginning with 5. Count to 93 by 10's beginning with 3, and so on. How does the table help you?

Give the following sums rapidly:

[illegible]

9	29	49
2	2	2
11	31	51

Add:

[illegible]

Copy and Add:

[illegible]

ORAL EXERCISES

Add:

1.	8 28	6 36	8 58	9 39	7 37
	5 5	6 6	7 7	3 3	8 8
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
2.	7 37	7 57	5 65	7 37	8 58
	6 6	7 7	9 9	9 9	9 9
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
3.	7 47	8 28	8 68	8 68	4 74
	4 4	4 4	8 8	6 6	9 9
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
4.	5 15	5 35	5 65	5 65	9 39
	6 6	7 7	8 8	9 9	8 8
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
5.	8 88	8 78	4 64	6 46	9 49
	3 3	9 9	8 8	5 5	6 6
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

WRITTEN EXERCISES

Copy and add:

1.	9 39	9 69	9 39	9 59	9 79
	9 9	8 8	7 7	6 6	5 5
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
2.	4 24	9 89	6 76	7 37	6 86
	7 7	4 4	7 7	8 8	9 9
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
3.	2 42	7 57	6 66	5 75	9 69
	9 9	9 9	8 8	6 6	4 4
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
4.	6 46	9 39	9 79	5 45	3 53
	9 9	2 2	7 7	8 8	9 9
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Play the game on page 71. Let one side of the room play against the other. Use combinations like those given on page 54. The more difficult addition combinations are among these.

$$\begin{array}{r} 8 \\ 5 \\ 4 \\ 6 \\ \hline 23 \end{array}$$

ORAL EXERCISES

[illegible]

WRITTEN EXERCISES

[illegible]

Problem. There are 23 children in one room and 34 in another. How many children are there in both rooms?

To find the number of children in both rooms add 23 and 34.

$23 = 2 \text{ tens} + 3 \text{ ones}$
$34 = 3 \text{ tens} + 4 \text{ ones}$
$57 = 5 \text{ tens} + 7 \text{ ones}$

Write *ones* under *ones* and *tens* under *tens*.

First add the ones, and then the tens.

In adding ones do not say, "3 and 4 are 7," but think rapidly 3, 7. Write 7 in one's place below the line. In adding tens, think 2, 5. Write 5.

23
34
<u>57</u>

Ones: 3, 7.

Tens: 2, 5.

The sum is 57.

Write 7.

Write 5.

} Short explanation.

WRITTEN EXERCISES

Copy and add:

1.	<u>43</u>	<u>34</u>	<u>52</u>	<u>41</u>	<u>43</u>	<u>35</u>	<u>64</u>	<u>43</u>
	<u>26</u>	<u>45</u>	<u>36</u>	<u>38</u>	<u>54</u>	<u>23</u>	<u>34</u>	<u>54</u>
2.	<u>37</u>	<u>53</u>	<u>61</u>	<u>34</u>	<u>15</u>	<u>25</u>	<u>52</u>	<u>43</u>
	<u>42</u>	<u>35</u>	<u>16</u>	<u>53</u>	<u>71</u>	<u>73</u>	<u>45</u>	<u>36</u>
3.	<u>73</u>	<u>65</u>	<u>55</u>	<u>54</u>	<u>45</u>	<u>52</u>	<u>47</u>	<u>56</u>
	<u>15</u>	<u>34</u>	<u>43</u>	<u>23</u>	<u>22</u>	<u>42</u>	<u>22</u>	<u>22</u>

ORAL EXERCISES

Copy the table on page 74 and paste it on cardboard for use here and later when reference is made to it.

1. Add 4 to each number in the first column of this table, and also to each number in the first three rows.
2. Add 5 to each number in the first column, and also to each number in the first three rows.

Tom has a little bank. He wants to save enough money to buy a pair of skates for 95 cents.

ORAL AND WRITTEN EXERCISES

1. One week he puts into the bank 7 cents and 1 nickel. How many cents is this?
2. The next week he puts in 1 cent, 2 nickels, and 1 dime. How many cents is this?
3. The third week he puts in 2 nickels and 2 cents. How many cents is this?
4. The fourth week he puts in 1 dime, 1 nickel, and 8 cents. How many cents is this?



First week...	12 cents
Second week...	21 cents
Third week...	12 cents
Fourth week...	23 cents

5. How much has Tom in the bank at the end of the fourth week? To find out how much he has, write down the number of cents for each week and add them.

6. The fifth week Tom puts in 4 cents and 1 nickel. He now has 68 cents and 9 cents. How much is this?
7. The sixth week he puts in 1 dime, and 2 cents. How much has he now?
8. Tom's father gives him a dime to add to his 89 cents. Has he enough money to buy the skates now?
9. After buying the skates, will he have any money left? How much?

77
12



Example 1. Add 28 cents and 35 cents.

28 cents = 2 dimes + 8 cents
<u>35 cents = 3 dimes + 5 cents</u>
63 cents 5 dimes 13 cents

First add the cents and then the dimes. 8 cents + 5 cents = 13 cents. 13 cents = 1 dime + 3 cents.

Write 3 in ones' place and add or *carry* the 1 dime to the dimes in the tens' column. 1 ten + 2 tens + 3 tens = 6 tens. Write 6 in tens' place.

Think rapidly: *Ones*: 8, 13. Write 3, carry 1.

Tens: 1 (carried), 3, 6. Write 6.

The sum is 63.

Example 2. Add 39, 26 and 19.

39	Write the numbers in a column as shown here.
----	--

26	<i>Ones</i> : Think 9, 15, 24. Write 4, carry 2 (tens).
----	---

19	<i>Tens</i> : 2 (carried), 5, 7, 8. Write 8.
----	--

84	The sum is 8 tens and 4 ones, or 84.
----	--------------------------------------

WRITTEN EXERCISES

Copy and add:

- | | | | | | | | | |
|----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1. | 27 | 29 | 54 | 23 | 38 | 34 | 43 | 56 |
| | <u>45</u> | <u>47</u> | <u>39</u> | <u>49</u> | <u>46</u> | <u>58</u> | <u>48</u> | <u>38</u> |
| 2. | 38 | 46 | 57 | 47 | 54 | 67 | 64 | 72 |
| | <u>54</u> | <u>39</u> | <u>26</u> | <u>38</u> | <u>27</u> | <u>19</u> | <u>29</u> | <u>19</u> |
| 3. | 13 | 38 | 68 | 44 | 54 | 16 | 25 | 8 |
| | 26 | 29 | 7 | 17 | 24 | 29 | 42 | 7 |
| | <u>24</u> | <u>17</u> | <u>13</u> | <u>24</u> | <u>17</u> | <u>34</u> | <u>18</u> | <u>61</u> |
| 4. | 18 | 41 | 37 | 54 | 57 | 14 | 61 | 79 |
| | 24 | 26 | 28 | 26 | 24 | 27 | 17 | 12 |
| | <u>37</u> | <u>15</u> | <u>14</u> | <u>11</u> | <u>14</u> | <u>39</u> | <u>8</u> | <u>7</u> |

WRITTEN EXERCISES

See how long it takes you to copy and add the following. Remember that the work is worthless unless it is accurate.

$$\begin{array}{r} 1. \quad \begin{array}{r} 45 \\ 29 \end{array} \quad \begin{array}{r} 37 \\ 28 \end{array} \quad \begin{array}{r} 27 \\ 49 \end{array} \quad \begin{array}{r} 32 \\ 48 \end{array} \quad \begin{array}{r} 23 \\ 28 \end{array} \quad \begin{array}{r} 47 \\ 19 \end{array} \quad \begin{array}{r} 28 \\ 45 \end{array} \quad \begin{array}{r} 57 \\ 34 \end{array} \end{array}$$

$$\begin{array}{r} 2. \quad \begin{array}{r} 14 \\ 27 \end{array} \quad \begin{array}{r} 18 \\ 13 \end{array} \quad \begin{array}{r} 15 \\ 52 \end{array} \quad \begin{array}{r} 26 \\ 13 \end{array} \quad \begin{array}{r} 28 \\ 39 \end{array} \quad \begin{array}{r} 18 \\ 57 \end{array} \quad \begin{array}{r} 26 \\ 13 \end{array} \quad \begin{array}{r} 9 \\ 4 \end{array} \end{array}$$

$$\begin{array}{r} 3. \quad \begin{array}{r} 50 \\ 5 \\ 14 \end{array} \quad \begin{array}{r} 34 \\ 3 \\ 7 \end{array} \quad \begin{array}{r} 34 \\ 28 \\ 8 \end{array} \quad \begin{array}{r} 43 \\ 19 \\ 7 \end{array} \quad \begin{array}{r} 37 \\ 24 \\ 5 \end{array} \quad \begin{array}{r} 58 \\ 19 \\ 7 \end{array} \quad \begin{array}{r} 9 \\ 39 \\ 24 \end{array} \quad \begin{array}{r} 7 \\ 12 \\ 42 \end{array} \end{array}$$

$$\begin{array}{r} 4. \quad \begin{array}{r} 32 \\ 14 \\ 17 \end{array} \quad \begin{array}{r} 4 \\ 19 \\ 24 \end{array} \quad \begin{array}{r} 7 \\ 12 \\ 68 \end{array} \quad \begin{array}{r} 9 \\ 4 \\ 14 \end{array} \quad \begin{array}{r} 24 \\ 19 \\ 7 \end{array} \quad \begin{array}{r} 53 \\ 19 \\ 23 \end{array} \quad \begin{array}{r} 12 \\ 47 \\ 16 \end{array} \quad \begin{array}{r} 16 \\ 5 \\ 24 \end{array} \end{array}$$

ORAL EXERCISES

To find a sum like $47+8$ do not add the ones and then carry. Try to think $47+8=55$ at once.

In this way add the following:

$$1. \quad \begin{array}{r} 36 \\ 7 \end{array} \quad \begin{array}{r} 18 \\ 6 \end{array} \quad \begin{array}{r} 17 \\ 9 \end{array} \quad \begin{array}{r} 24 \\ 7 \end{array} \quad \begin{array}{r} 35 \\ 7 \end{array} \quad \begin{array}{r} 24 \\ 8 \end{array} \quad \begin{array}{r} 16 \\ 7 \end{array} \quad \begin{array}{r} 15 \\ 9 \end{array}$$

$$2. \quad \begin{array}{r} 18 \\ 7 \end{array} \quad \begin{array}{r} 19 \\ 6 \end{array} \quad \begin{array}{r} 17 \\ 8 \end{array} \quad \begin{array}{r} 25 \\ 6 \end{array} \quad \begin{array}{r} 27 \\ 5 \end{array} \quad \begin{array}{r} 18 \\ 5 \end{array} \quad \begin{array}{r} 19 \\ 7 \end{array} \quad \begin{array}{r} 16 \\ 6 \end{array}$$

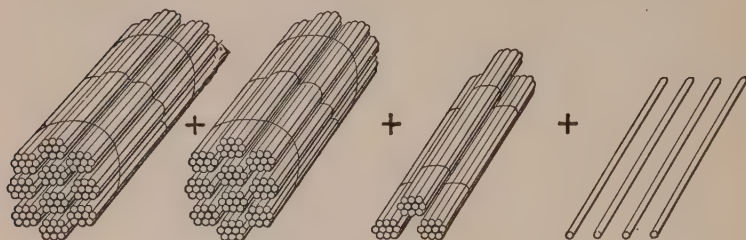
$$3. \quad \begin{array}{r} 27 \\ 8 \end{array} \quad \begin{array}{r} 24 \\ 9 \end{array} \quad \begin{array}{r} 26 \\ 8 \end{array} \quad \begin{array}{r} 28 \\ 8 \end{array} \quad \begin{array}{r} 25 \\ 6 \end{array} \quad \begin{array}{r} 26 \\ 9 \end{array} \quad \begin{array}{r} 23 \\ 8 \end{array} \quad \begin{array}{r} 28 \\ 7 \end{array}$$

$$4. \quad \begin{array}{r} 35 \\ 9 \end{array} \quad \begin{array}{r} 77 \\ 8 \end{array} \quad \begin{array}{r} 83 \\ 9 \end{array} \quad \begin{array}{r} 45 \\ 7 \end{array} \quad \begin{array}{r} 64 \\ 7 \end{array} \quad \begin{array}{r} 87 \\ 9 \end{array} \quad \begin{array}{r} 67 \\ 9 \end{array} \quad \begin{array}{r} 37 \\ 5 \end{array}$$

Hundreds. Thousands. Ten 10's are called one *hundred*, written 100. Two 100's are written 200, three 100's are written 300, and so on.

Ten 100's are called one *thousand*, written 1000.

Beginning with ones' place and counting to the left the third place is called **hundreds' place** and the fourth place is called **thousands' place**.



$$200 + 30 + 4 = 234.$$

In the number 420, there are 4 hundreds, 2 tens, and no ones. It is read four hundred twenty. In the number 507, there are 5 hundreds, no tens and 7 ones. It is read five hundred seven.

ORAL EXERCISES

1. What figure represents ones, what figure represents tens and what figure represents hundreds in 113? In 300? In 530? In 242? In 308? In 460? In 700? In 678?
2. Count by 10's from 100 to 200.
3. Count by ones from 290 to 310.
The number 293 is read two hundred ninety-three, *not* two hundred *and* ninety-three.
4. Read the following numbers: 361, 475, 952, 259, 163, 613, 473, 829, 982, 298, 567.

WRITTEN AND ORAL EXERCISES

1. Write the following numbers, using figures:

Three hundred thirty-six	Four hundred seventy-three
Five hundred sixty-nine	Eight hundred thirty-five
Seven hundred sixty-two	Nine hundred fifty-seven
Six hundred thirty-one	Two hundred ninety-eight
Nine hundred seventy-eight	One hundred ten
Four hundred eight	Three hundred sixty
Eight hundred forty-two	Four hundred sixteen
One hundred one	Seven hundred nine

2. How many days are there in a year? If you do not know ask the teacher or your parents. Write this number and read it.
3. How many children are there in your school? The teacher will be able to tell you just about how many there are. Write this number and read it. Is this more or less than 100? Is it more or less than 1000?
4. Read the following sentences: "The Woolworth Building in the city of New York is 780 feet high. The Eiffel Tower, in Paris, is 984 feet high. The Washington Monument is 555 feet high."
Which of these three buildings is the tallest? Which is the lowest?
5. If you live in a city, find out who in your class live at house numbers between 100 and 1000.
Make a list of these numbers and read them. Tell which is the smallest and which is the greatest among them.
6. If you live in the country, find how many dollars it takes to buy a good horse. Is this number greater or less than 100? Is it greater or less than 1000?

Problem. One of two troop trains had 243 soldiers on board, and the other had 325. How many soldiers were there on the two trains?

To find how many soldiers there were on the two trains add 243 and 325.

243	Ones: 3, 8. Write 8.	Write ones under ones,
325	Tens: 4, 6. Write 6.	tens under tens, and hun-
568	Hundreds: 2, 5. Write 5.	dreds under hundreds.

The sum is 5 hundreds, 6 tens, 8 ones, or 568. Hence there were 568 soldiers on the two trains.

WRITTEN EXERCISES

Copy and add:

1.	235	345	513	274	421	172
	<u>423</u>	<u>512</u>	<u>475</u>	<u>622</u>	<u>378</u>	<u>416</u>
2.	124	345	612	543	435	112
	213	211	143	214	322	242
	<u>321</u>	<u>433</u>	<u>233</u>	<u>232</u>	<u>242</u>	<u>644</u> .

Example. Add 176 and 317.

176	Ones: 6, 13. Write 3. carry 1.
317	Tens: 1 (carried), 8, 9. Write 9.
<u>493</u>	Hundreds: 1, 4. Write 4.

The sum is 4 hundreds, 9 tens, 3 ones, or 493.

WRITTEN EXERCISES

Copy and add:

1.	249	374	528	829	437	224
	<u>537</u>	<u>519</u>	<u>436</u>	<u>164</u>	<u>456</u>	<u>668</u>
2.	318	141	425	151	524	434
	234	328	247	315	328	217
	<u>227</u>	<u>226</u>	<u>324</u>	<u>219</u>	<u>147</u>	<u>248</u>

Add: 472 *Ones:* 2, 6. Write 6.
 864 *Tens:* 7, 13. Write 3, carry 1.
 1336 *Hundreds:* 1 (carried), 5, 13. Write 13.

The sum is 13 hundreds, 3 tens, 6 ones, or 1336. Read this number.

WRITTEN EXERCISES

Copy and add:

1.	343	256	472	513	437	352
	<u>586</u>	<u>382</u>	<u>387</u>	<u>296</u>	<u>492</u>	<u>475</u>
2.	423	764	372	256	734	856
	<u>294</u>	<u>294</u>	<u>456</u>	<u>373</u>	<u>195</u>	<u>192</u>
3.	264	352	493	342	154	567
	<u>473</u>	<u>486</u>	<u>246</u>	<u>396</u>	<u>275</u>	<u>282</u>

Add: 475 *Ones:* 5, 10. Write 0, carry 1.
 365 *Tens:* 1 (carried), 8, 14. Write 4, carry 1.
 840 *Hundreds:* 1 (carried), 5, 8. Write 8.

The sum is 840. Read this number.

WRITTEN EXERCISES

Copy and add:

1.	246	174	169	537	287	246
	<u>385</u>	<u>488</u>	<u>184</u>	<u>185</u>	<u>469</u>	<u>198</u>
2.	682	442	482	523	326	294
	134	192	124	194	194	378
	<u>129</u>	<u>287</u>	<u>134</u>	<u>257</u>	<u>215</u>	<u>164</u>
3.	246	412	348	473	539	243
	432	297	296	298	187	367
	<u>196</u>	<u>219</u>	<u>184</u>	<u>264</u>	<u>194</u>	<u>181</u>

The sign for dollars is \$. One dollar and twenty-five cents is written \$1.25. The point (called the decimal point) between the 1 and 2 is used to separate the dollars from the cents. 39 cents is written \$0.39, or \$.39, or 39¢. \$3.00 means 3 dollars and no cents. 3 dollars is also written \$3.

In reading dollars and cents always read *and* between the dollars and the cents, as has just been done.

In a number like \$3.45, the 5 represents cents, the 4 dimes and the 3 dollars.

Read the following and state how many cents, dimes, and dollars in each one: \$1.85, \$0.54, \$0.07, \$1.35, \$2.50, \$5.00.

Add: \$3.18 *Ones:* 8, 16, 21. Write 1, carry 2.

2.68 *Tens:* 2 (carried), 3, 9, 18. Write 8, carry 1.

1.95 *Hundreds:* 1 (carried), 4, 6, 7. Write 7.

\$7.81

The first column represents cents, and its sum is 21 cents, or 2 dimes and 1 cent. The 2 dimes are carried to the second column, which represents dimes. The sum of this column with the two carried is 18 dimes, or 1 dollar and 8 dimes. The 1 dollar is carried to the next column.

In writing a column of figures representing dollars and cents be careful to put all the decimal points in a column. Add such numbers just like other numbers. Place the decimal point in the sum directly under the other decimal points. The dollar sign is written only before the first one of the numbers to be added and before the sum.

WRITTEN EXERCISES

Copy and add the following:

1. \$3.55	2. \$6.28	3. \$0.39	4. \$1.58	5. \$2.45
0.45	5.96	4.47	2.32	1.60
<u>2.37</u>	<u>0.42</u>	<u>1.75</u>	<u>3.91</u>	<u>2.75</u>

ORAL AND WRITTEN EXERCISES

1. Robert's mother gives him an allowance of 10¢ a week. He begins early in November to save money for Christmas. Each week he puts 6 cents into his little bank. How much does he put into the bank in 4 weeks?
2. Uncle John puts 25¢ into Robert's bank at Thanksgiving. How much does that make when added to 24 cents?
3. In December Robert puts 10 cents into his bank each week for 3 weeks. How much is this?
4. In December Robert earns 18 cents extra, which he also puts into his bank. By this time how much money does Robert have with which to buy Christmas presents.



Saved in November.....	24¢
From Uncle John.....	25¢
Saved in December.....	30¢
Earned extra in December	<u>18¢</u>
Total.....	

5. What gifts may Robert get for his father, mother, baby sister and Uncle John with this sum?
6. George has \$.95 with which to buy presents. Make number stories about how George saved his money.
7. In what coins could George have his money?
8. If George spends \$.95 for presents, Robert, \$.97, and Mary \$1.28, how much do they all spend for presents?



WRITTEN EXERCISES

1. James sold 24 copies of the *News* for 1 cent each, 17 copies of the *American* for 1 cent each, and 15 copies of the *Globe* for 1 cent each. How much did he get for all his papers?

This table gives the number of papers James sold each day for a week:

	Mon- day	Tues- day	Wednes- day	Thurs- day	Fri- day	Satur- day
<i>News</i>	26	30	29	34	27	28
<i>American</i>	29	22	33	24	31	24
<i>Globe</i>	12	14	11	12	13	17
<i>Telegram</i>	15	19	17	12	20	14

- Find how many papers he sold each day.
- Find how many papers he sold the whole week by adding the total daily sales.
- If he received 1 cent for each paper, how much money did he take in each day?
- How many cents did he get for all the papers he sold this week? Write this sum.
- How much money would James get for all these papers if he sold them at 2 cents apiece?
- One week a newsboy sold 500 papers at 2 cents apiece. How much did he get for them?
- If papers were sold to the newsboys at \$1.35 a hundred how much would they make by selling 100 papers at 2 cents a copy?

ORAL EXERCISES

1. Add 3 to each number in the table on page 74. Add by lines.
2. Count to 100 by 3's beginning with 1.
3. Count to 98 by 3's beginning with 2.
4. Count to 99 by 3's beginning with 3.
5. How does $8+3=11$ help to find $78+3=81$?
6. Add 3 to each of these numbers: 29, 38, 19, 18, 47, 28, 58, 49, 68, 79, 89, 39, 88, 59, 98.

WRITTEN EXERCISES

1. Ask your teacher how many children there are in each room on your floor of the school building. How can you find out how many children there are all together on your floor? Find this number.
2. Find how many boys there are in each room. How many boys are there all together on your floor?
3. Find how many girls there are in each room. How many girls are there all together on your floor?
4. Add the total number of girls and the total number of boys to see how many children there are all together on your floor. Is this sum the same as the one you got in Example 1? If it is not, try to find out what is wrong.

Which is easier—to find how many children there are on your floor by first counting the number in each room and then adding, or by counting up the whole number at once?

If your school has only one or two rooms, play that you are in a large school. The teacher will help you make up numbers for the rooms.

ORAL EXERCISES

1. Add 4 to each number in the table on page 74. Add by lines.
2. Count to 97 by 4's beginning with 1.
3. Count to 98 by 4's beginning with 2.
4. Count to 99 by 4's beginning with 3.
5. How does $9+4=13$ help to find $59+4=63$?
6. Add 4 to each of the following: 37, 48, 59, 76, 38, 49, 58, 78, 27, 39, 28, 85, 29, 87, 26, 36, 89, 47, 79, 68, 77, 69, 46, 57, 66, 86, 67, 45, 74.

WRITTEN EXERCISES

See in how many minutes you can copy and add the following:

Add downward and then test by adding upward.

1. 382	2. 198	3. 281	4. 547
124	247	132	184
197	369	164	111
<u>218</u>	<u>163</u>	<u>217</u>	<u>271</u>

5. 276	6. 317	7. 186	8. 137
184	298	138	429
397	132	291	127
<u>158</u>	<u>174</u>	<u>187</u>	<u>174</u>

9. 142	10. 217	11. 359	12. 234
182	171	195	256
253	284	114	178
264	151	152	191
<u>182</u>	<u>162</u>	<u>127</u>	<u>123</u>

A CROSS-COUNTRY RACE

The class is to be divided into six or seven teams for a cross-country race. Captains are first selected and they choose the teams. Each captain is allowed to choose one child at a time.

The teacher reads columns of numbers to be added and the children copy them. Then all the children add the columns as fast as they can. When the first child finishes he holds up his hand, and the teacher gives him the number 1, which he writes on his paper as his score and immediately turns the paper down on his desk. The child who finishes next is given the number 2 as his score, and so on.

If two children finish at the same time they are given the same score.

The children exchange papers, and mark them as the teacher reads the sums. If an example is not done at all, or if the answer is wrong, then 5 is added to the score. If two are wrong 10 is added to the score, and so on.

The team that gets the smallest total score wins, and the one that gets the largest score is last in the race.

In one school where they used this game they named the teams after some large schools in the city. Try to find good names for your teams.

WRITTEN EXERCISES

In such a race the teacher reads the five columns of numbers given below.

See how long it takes you to copy them all neatly and add them.

1. 436	2. 643	3. 790	4. 124	5. 147
569	908	467	680	358
234	460	248	357	491
<u>436</u>	<u>376</u>	<u>926</u>	<u>913</u>	<u>578</u>

Problem. A farmer had 79 head of cattle and sold 34 of them. How many had he left? How do you find out?

To find how many cattle he had left subtract 34 from 79.

79 34 45	<i>Ones:</i> $9 = 4 + 5$. Write 5. }	First
	<i>Tens:</i> $7 = 3 + 4$. Write 4. }	Method
	<i>Ones:</i> 4 from 9 leaves 5. Write 5. }	Second
	<i>Tens:</i> 3 from 7 leaves 4. Write 4. }	Method

Example. From 489 subtract 201.

489 201 288	<i>Ones:</i> $9 = 1 + 8$. Write 8. }	First
	<i>Tens:</i> $8 = 0 + 8$. Write 8. }	Method
	<i>Hundreds:</i> $4 = 2 + 2$. Write 2. }	
	<i>Ones:</i> 1 from 9 leaves 8. Write 8. }	Second
	<i>Tens:</i> 0 from 8 leaves 8. Write 8. }	Method
	<i>Hundreds:</i> 2 from 4 leaves 2. Write 2. }	

The result found in subtraction is called **difference** or **remainder**.

We can find the difference between two numbers by taking the smaller away from the larger or by finding how much must be added to the smaller to make the sum equal to the larger. You should choose one of these methods now, and use that one only.

WRITTEN EXERCISES

Copy and subtract:

1.	89 <u>43</u>	37 <u>14</u>	78 <u>34</u>	57 <u>26</u>	84 <u>21</u>	79 <u>36</u>	85 <u>63</u>	97 <u>45</u>
2.	93 <u>41</u>	59 <u>42</u>	95 <u>34</u>	99 <u>47</u>	98 <u>67</u>	86 <u>43</u>	78 <u>23</u>	84 <u>41</u>
3.	874 <u>561</u>	856 <u>432</u>	478 <u>134</u>	579 <u>348</u>	639 <u>416</u>	794 <u>342</u>	587 <u>134</u>	934 <u>423</u>

John is 9 years old.
Harry is 14 years old.
Their father is 45
years old.

ORAL AND WRITTEN EXERCISES

1. How old was John's father
9 years ago when John was
born?

2. How old was Harry's
father 14 years ago?

We must subtract 14
from 45.

$$\begin{array}{r} 45 \\ 14 \\ \hline 31 \end{array}$$



3. In how many years will Harry be 45 years old? How
do you find out?

4. How many years ago was Harry's father 14 years old?
How do you find out?

John weighs 62 pounds. Harry weighs 83
pounds. Their father weighs 187 pounds.

5. Harry weighs how much more than John?

Remember that in subtraction problems the smaller
number is placed below the larger. That is, we subtract the
smaller number from the larger.

6. John weighs how much less than his father?

7. Harry weighs how much less than his father?

8. Does the father weigh more or less than John and Harry
together? How much?

9. How much will John have to gain to weigh as much as
his father does now?

ORAL EXERCISES

1. Add 5 to each number in the table on page 74. Add by lines.
2. Begin with 1 and count to 96 by 5's.
3. Add 5 to each of the following numbers: 26, 38, 47, 45, 79, 65, 27, 39, 46, 55, 67, 78, 25, 37, 87, 57, 66, 77, 28, 36, 75, 56, 68, 89.
4. Begin with 2 and count to 98 by 6's.
5. Add 6 to each number in the last 5 lines of the table on page 74.
6. Add 7 to each of the last six lines of this table.
7. Add 6 to each of the numbers 27, 36, 49, 57, 48, 25, 56, 77, 36, 75, 68, 89.

Problem. Henry wants to buy a pair of skates which cost \$2.75. If he has \$1.42 cents in his bank, how much more must he get to buy the skates? How do you find out?

To find how much more money he must have, subtract \$1.42 from \$2.75.

\$2.75
<u>1.42</u>
\$1.33

Subtract just as if there were no decimal points.

Then put a decimal point in the answer just below the decimal points in the other numbers.

The remainder is \$1.33, and this is the amount Henry must get to buy the skates.

WRITTEN EXERCISES

Copy and subtract:

1. \$4.85

$$\begin{array}{r} 2.40 \\ \hline \end{array}$$

2. \$7.60

$$\begin{array}{r} 3.40 \\ \hline \end{array}$$

3. \$8.75

$$\begin{array}{r} 4.25 \\ \hline \end{array}$$

4. \$9.76

$$\begin{array}{r} 4.24 \\ \hline \end{array}$$

5. \$7.45

$$\begin{array}{r} 2.32 \\ \hline \end{array}$$

6. \$12.46

$$\begin{array}{r} 1.24 \\ \hline \end{array}$$

7. \$6.35

$$\begin{array}{r} 2.15 \\ \hline \end{array}$$

8. \$9.78

$$\begin{array}{r} 2.47 \\ \hline \end{array}$$

Some third-grade children made candy for Christmas. They figured the cost of it to see whether it was cheaper to make the candy than to buy it at the store. They used:

3 cups of sugar at 4¢ a cup,
Syrup worth 5 cents,
 $\frac{1}{4}$ of a dozen eggs at 40¢ a dozen,
1 pound of English walnuts at 20¢.

ORAL AND WRITTEN EXERCISES

1. How much did the sugar cost them?
2. How much did the eggs cost them?
3. How much did all the materials cost?
4. They made 2 pounds of candy which would cost 60¢ a pound at the store. How much would they have to pay for 2 pounds of candy at the store?
5. How much would the candy cost if they used 10 cents' worth of shelled pecans instead of the 20 cents' worth of English walnuts?
6. What is the cost of 3 pounds of stick candy at 25 cents a pound?
7. What is the cost of 4 pounds of brittle candy at 20 cents a pound?
8. If chocolate candy costs 80 cents a pound, how much will $\frac{1}{2}$ a pound cost?
9. Mary spent 20 cents for candy, and her sister Elsie spent 30 cents. How much did they spend together?
10. In a large Sunday School they had \$5.60 with which to buy Christmas candy. How much did they have left after spending \$4.20?

12¢
5¢
10¢
<u>20¢</u>

ORAL EXERCISES

1. Vera has fifty cents with which to buy Christmas presents. What can she buy from the following list?



Handkerchiefs, 10¢, 15¢, 25¢, 40¢
Neckties, 25¢, 50¢
Shaving cups, 10¢, 15¢, 20¢, 50¢
Salts and peppers, 25¢, 50¢
Nail files, 10¢, 15¢, 20¢
Boxes of candy, 25¢, 40¢, 50¢
Dolls, 15¢, 25¢, 50¢
Drums, 25¢, 40¢, 50¢
Toy automobiles, 20¢, 30¢, 50¢

2. If you had one dollar to spend, what would you buy from this list?
3. Tell what presents you would buy from this list if you had \$1.50 to spend. Also tell what you would buy if you had seventy-five cents to spend.
4. Nellie bought a handkerchief for 25¢ for her mother, a tie for 25¢ for her brother, a tie for 50¢ for her father, and a doll for 15¢ for her little sister. How much did all these cost her?
5. John bought a toy automobile for 30¢, a nail file for 20¢, and a drum for 40¢. How much did all these cost him? How much change did he get from one dollar?
6. Find the cost of some presents you would like to buy. Then tell a story about what you will get for the money you have to spend for Christmas presents.

WRITTEN EXERCISES

1. Walter saved \$2.20 for Christmas, and his sister Jane saved \$3.75. How much less did Walter save than Jane? How do you find out?

We must subtract \$2.20 from \$3.75. Place the smaller number below the larger. Be sure that the decimal points are in column.

\$3.75
2.20
\$1.55

2. Name some presents that Jane and Walter could buy with their money. How much would these presents cost?
3. Albert wants to buy a sled which costs \$2.45. He has \$1.23 in his bank. How much more must he get before he can buy the sled? How do you find out?
4. Henry went into a store with \$3.85 in his pocket, and came out with \$1.42. How much did he spend in the store? How do you find out?
5. Mr. Harper spent \$1.50 for a present for his son Harry, \$1.75 for his son John, \$2.25 for his daughter Alice, and \$1.00 for a servant. How much did all these presents cost him? How do you find out?
6. Mary bought the following presents: two handkerchiefs for her mother for 49 cents, a tie for her father for 50 cents, a knife for her brother for 65 cents, and a doll for her little sister for 40 cents. How much did all these presents cost her?
7. A Sunday School has a Christmas tree on which there is a present for every child in the school. There are 8 children in the first class, 14 in the second, 12 in each of the third and fourth classes, and 17 in the fifth class. How many presents are there on the tree?

ORAL EXERCISES

1. Review the table of 2's on pages 18 and 35.

Give the products of the following:

2.	2	4	2	6	9	2	3	2	1	2
	4	2	6	2	2	9	2	3	2	1
3.	8	2	5	2	2	2	7	2	10	9
	2	8	2	5	2	7	2	10	2	2

Six of anything may be divided in two groups of 3 in each. Then each group is $\frac{1}{2}$ of 6. This may be expressed by $6 \div 2 = 3$, which is read "6 divided by 2 equals 3".

The result found by dividing is called the **quotient**.
The sign of division $\div$ is read "divided by."



8 can be divided into 4 equal groups with 2 in each group. That is, $8 \div 4 = 2$, or $\frac{1}{4}$ of $8 = 2$.



8 can be divided into 2 equal groups with 4 in each group. That is, $8 \div 2 = 4$, or $\frac{1}{2}$ of $8 = 4$.

All these facts we may learn at once from $2 \times 4 = 8$.

Read and supply the missing numbers in the following:

4.	$2 \times 6 = ?$	5.	$2 \times 8 = ?$	6.	$2 \times 10 = ?$
	$12 \div 2 = ?$		$16 \div 2 = ?$		$20 \div 2 = ?$
	$12 \div 6 = ?$		$16 \div 8 = ?$		$20 \div 10 = ?$
	$\frac{1}{2}$ of $12 = ?$		$\frac{1}{2}$ of $16 = ?$		$\frac{1}{2}$ of $20 = ?$
	$\frac{1}{6}$ of $12 = ?$		$\frac{1}{8}$ of $16 = ?$		$\frac{1}{10}$ of $20 = ?$

7. Give similar combinations for 2×5 , 2×7 , 2×9 .

ORAL AND WRITTEN EXERCISES

1. Review the table of 3's on pages 20 and 61.
2. Supply the missing numbers in the following:

$6+3=?$

$9+3=?$

$12+3=?$

$15+3=?$

$3 \times 3=?$

$4 \times 3=?$

$5 \times 3=?$

$6 \times 3=?$

$18+3=?$

$21+3=?$

$24+3=?$

$27+3=?$

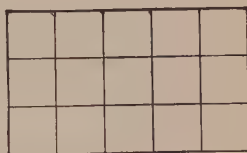
$7 \times 3=?$

$8 \times 3=?$

$9 \times 3=?$

$10 \times 3=?$

From the rectangle we see that 3 rows with 5 in each contain the same number as 5 rows with 3 in each. That is, $3 \times 5 = 5 \times 3$.



3. Draw a rectangle to show that $3 \times 6 = 6 \times 3$.

In this way we may show that $3 \times 7 = 7 \times 3$, $3 \times 8 = 8 \times 3$, $3 \times 9 = 9 \times 3$, and $3 \times 10 = 10 \times 3$.

The product of two numbers is the same when their order is reversed.

From now on we will record among the new number facts only one of two such combinations as $3 \times 8 = 24$ and $8 \times 3 = 24$. When we know one of these we always know the other.

New Number
Facts

$9 \times 3 = 27$

$10 \times 3 = 30$

4. Write the table of 3's beginning with 3×1 , 3×2 , 3×3 , and so on.
5. If you know that $6 \times 3 = 18$, how do you know from that that $3 \times 6 = 18$?
6. Play a game like that on page 19, using the tables of 2's and 3's.

ORAL EXERCISES

Read and supply the missing numbers:

- | | | | | | |
|----|-------------------------|------|-------------------------|------|-------------------------|
| 1. | 1 yard = | feet | 3 yards = | feet | |
| | 5 yards = | feet | 6 yards = | feet | |
| | 4 yards = | feet | 9 yards = | feet | |
| | 2 yards = | feet | 7 yards = | feet | |
| | 8 yards = | feet | 10 yards = | feet | |
| 2. | $2 \times 3 = ?$ | 3. | $4 \times 3 = ?$ | 4. | $5 \times 3 = ?$ |
| | $3 \times 2 = ?$ | | $3 \times 4 = ?$ | | $3 \times 5 = ?$ |
| | $6 \div 2 = ?$ | | $12 \div 3 = ?$ | | $15 \div 3 = ?$ |
| | $6 \div 3 = ?$ | | $12 \div 4 = ?$ | | $15 \div 5 = ?$ |
| | $\frac{1}{2}$ of 6 = ? | | $\frac{1}{3}$ of 12 = ? | | $\frac{1}{3}$ of 15 = ? |
| | $\frac{1}{3}$ of 6 = ? | | $\frac{1}{4}$ of 12 = ? | | $\frac{1}{5}$ of 15 = ? |
| 5. | $6 \times 3 = ?$ | 6. | $7 \times 3 = ?$ | 7. | $8 \times 3 = ?$ |
| | $3 \times 6 = ?$ | | $3 \times 7 = ?$ | | $3 \times 8 = ?$ |
| | $18 \div 3 = ?$ | | $21 \div 3 = ?$ | | $24 \div 3 = ?$ |
| | $18 \div 6 = ?$ | | $21 \div 7 = ?$ | | $24 \div 8 = ?$ |
| | $\frac{1}{3}$ of 18 = ? | | $\frac{1}{3}$ of 21 = ? | | $\frac{1}{3}$ of 24 = ? |
| | $\frac{1}{6}$ of 18 = ? | | $\frac{1}{7}$ of 21 = ? | | $\frac{1}{8}$ of 24 = ? |

8. Give combinations like those given above for 9×3 and for 10×3 .

9. What other combinations are known from $3 \times 3 = 9$?

10. At 3 cents apiece what is the cost of 6 pencils? Of 7 pencils? Of 9 pencils?

11. In a certain city children pay 3 cents for carfare. How much do 8 rides cost in that city? 5 rides? 4 rides? 3 rides?

12. How many yards are there in 18 feet? In 24 feet? In 12 feet? In 30 feet? In 15 feet? In 27 feet? In 21 feet?

ORAL EXERCISES

$$\begin{array}{llll}
 24+4=? & 28+4=? & 32+4=? & 36+4=? \\
 7\times 4=? & 8\times 4=? & 9\times 4=? & 10\times 4=?
 \end{array}$$

New Number Facts

$$7\times 4=28 \quad 8\times 4=32 \quad 9\times 4=36 \quad 10\times 4=40$$

Give the products of the following:

$$\begin{array}{r}
 \text{1.} \quad \begin{array}{r} 4 \\ 2 \\ \hline \end{array} \quad \begin{array}{r} 2 \\ 4 \\ \hline \end{array} \quad \begin{array}{r} 6 \\ 2 \\ \hline \end{array} \quad \begin{array}{r} 2 \\ 6 \\ \hline \end{array} \quad \begin{array}{r} 7 \\ 2 \\ \hline \end{array} \quad \begin{array}{r} 2 \\ 7 \\ \hline \end{array} \quad \begin{array}{r} 3 \\ 4 \\ \hline \end{array} \quad \begin{array}{r} 4 \\ 3 \\ \hline \end{array} \quad \begin{array}{r} 1 \\ 4 \\ \hline \end{array} \quad \begin{array}{r} 4 \\ 1 \\ \hline \end{array} \\
 \text{2.} \quad \begin{array}{r} 5 \\ 4 \\ \hline \end{array} \quad \begin{array}{r} 4 \\ 5 \\ \hline \end{array} \quad \begin{array}{r} 8 \\ 4 \\ \hline \end{array} \quad \begin{array}{r} 4 \\ 8 \\ \hline \end{array} \quad \begin{array}{r} 10 \\ 4 \\ \hline \end{array} \quad \begin{array}{r} 4 \\ 10 \\ \hline \end{array} \quad \begin{array}{r} 4 \\ 4 \\ \hline \end{array} \quad \begin{array}{r} 9 \\ 4 \\ \hline \end{array} \quad \begin{array}{r} 4 \\ 9 \\ \hline \end{array}
 \end{array}$$

If any of these cause you trouble make a list of them and make sure you learn them well.

Read and supply the missing numbers in:

$$\begin{array}{lll}
 \text{3.} & 2\times 4=? & \text{4.} \quad 3\times 4=? \\
 & 4\times 2=? & \quad 4\times 3=? \\
 & 8\div 2=? & \quad 12\div 3=? \\
 & 8\div 4=? & \quad 12\div 4=? \\
 & \frac{1}{2} \text{ of } 8=? & \quad \frac{1}{3} \text{ of } 12=? \\
 & \frac{1}{4} \text{ of } 8=? & \quad \frac{1}{4} \text{ of } 12=? \\
 \text{6.} & 6\times 4=? & \text{7.} \quad 7\times 4=? \\
 & 4\times 6=? & \quad 4\times 7=? \\
 & 24\div 4=? & \quad 28\div 4=? \\
 & 24\div 6=? & \quad 28\div 7=? \\
 & \frac{1}{4} \text{ of } 24=? & \quad \frac{1}{4} \text{ of } 28=? \\
 & \frac{1}{6} \text{ of } 24=? & \quad \frac{1}{7} \text{ of } 28=? \\
 \text{8.} & 8\times 4=? & \\
 & 4\times 8=? & \\
 & 32\div 4=? & \\
 & 32\div 8=? & \\
 & \frac{1}{4} \text{ of } 32=? & \\
 & \frac{1}{8} \text{ of } 32=? &
 \end{array}$$

9. Give similar combinations for 9×4 and for 10×40 .

10. What other combinations do we know from $4\times 4=16$.



In keeping tally, marks are put in groups of five like this . Then the groups are counted.

ORAL EXERCISES

1. Review the table of 5's on pages 40 and 41. By counting the number of groups, tell how many marks there are in each of the following:
2. 
3. 
4. 
5. 
6. Give all the combinations which you know from $4 \times 5 = 20$.
7. Give all the combinations which you know from each of the combinations 6×5 , 7×5 , 8×5 , 9×5 .

Cards for a Number Game. Cut out cards 5 inches long and 3 inches wide and write numbers on them to make a set like those shown on the next page. These cards represent the table of 3's.

Make cards like these for all the tables you have learned.

Question cards	1 3	2 3	3 3	4 3	5 3	6 3	7 3	8 3	9 3	10 3
Answer cards	3	6	9	12	15	18	21	24	27	30

A NUMBER GAME

For the following game, two answer cards are needed for each question card.

Two captains are appointed and they choose teams. Each child gets an answer card; and the teacher keeps all the question cards. The answer cards are given out in such a way that each team has an answer for each question card.

The teacher holds up a question card. The child who first holds up the right answer card gets a score for his team. When two children, one from each team, hold up the right card at the same time, each team gets a score.

When a child holds up a wrong answer card, his team loses one score. The teacher or one of the children keeps score.

In one school where this game was played, one team was called the *Giants*, and the other the *Cubs*.

Giants' score 
Cubs' score 

After playing for a while the children exchange cards.

Sometimes the teacher takes the answer cards and holds them up. The children must then hold up the right question cards.



ORAL EXERCISES

1. How much does an ordinary milk bottle hold?
2. Sometimes milk is bought by the pint. How many pints are there in one quart?
3. Cream is often bought in half-pint bottles. How many half-pints equal one quart?
4. If cream is 9 cents a half-pint, how much is a pint worth? A quart?
5. Find out how much milk and cream cost in your town. How much does a quart of milk cost? A quart of cream?
6. Find out how many quarts there are in one gallon.



7. In hotels and boarding houses milk is often bought by the gallon. How many quarts are there in 8 gallons?
8. At 24 cents a gallon for milk, what is the price per quart? At 32 cents a gallon, what is the price per quart?
9. Name all the articles you can think of that are sold by the gallon.

The gill is a small measure that is not much used. There are 4 gills in 1 pint.

An ordinary glass holds about a half-pint.

THE TABLE OF LIQUID MEASURE

4 gills = 1 pint (4 gi. = 1 pt.)
 2 pints = 1 quart (2 pt. = 1 qt.)
 4 quarts = 1 gallon (4 qt. = 1 gal.)

ORAL EXERCISES

1. Read the following and supply the missing numbers:

4 gal. = qt. 3 gal. = qt.

2 gal. = qt. 9 gal. = qt.

6 gal. = qt. 7 gal. = qt.

5 gal. = qt. 8 gal. = qt.

2. A pint is what part of a quart?

3. A quart is what part of a gallon?

5

Division is often indicated by writing $4\overline{)20} = 5$ or $4\overline{)20}$ instead of $20 \div 4 = 5$.

Give the quotients in the following:

4. $4\overline{)16}$ $5\overline{)35}$ $3\overline{)12}$ $2\overline{)12}$ $8\overline{)24}$ $8\overline{)16}$

5. $4\overline{)12}$ $5\overline{)25}$ $3\overline{)24}$ $2\overline{)14}$ $8\overline{)16}$ $9\overline{)45}$

6. $4\overline{)20}$ $5\overline{)45}$ $3\overline{)18}$ $2\overline{)10}$ $8\overline{)40}$ $6\overline{)12}$

7. $4\overline{)32}$ $5\overline{)50}$ $3\overline{)30}$ $2\overline{)8}$ $7\overline{)14}$ $6\overline{)18}$

8. $4\overline{)8}$ $5\overline{)40}$ $3\overline{)15}$ $2\overline{)18}$ $7\overline{)21}$ $6\overline{)24}$

9. $4\overline{)24}$ $5\overline{)30}$ $3\overline{)9}$ $2\overline{)16}$ $7\overline{)35}$ $6\overline{)30}$

10. $4\overline{)36}$ $5\overline{)20}$ $3\overline{)21}$ $2\overline{)4}$ $9\overline{)18}$ $8\overline{)80}$

11. $4\overline{)40}$ $5\overline{)15}$ $3\overline{)27}$ $2\overline{)20}$ $9\overline{)45}$ $9\overline{)90}$

Play a game like the one on page 71, supplying missing numbers in combinations such as $\frac{1}{5}$ of 25, $6\overline{)30}$.

ORAL EXERCISES

1. How many days do you go to school each week?
2. How many days do you go to school in 2 weeks? In 3 weeks? In 4 weeks? In 5 weeks? In 6 weeks? In 7 weeks? In 8 weeks? In 9 weeks? In 10 weeks?
3. How many days do you attend school in 4 weeks if you miss school 2 days?
4. How many days do you attend school in 8 weeks if you miss school 3 days?
5. How many days do you miss school if you attend 48 days in 10 weeks?
6. What children in your room have had perfect attendance for a month? What child has the longest record for perfect attendance? How many days of perfect attendance does this record show?
7. How many 5's are there in 10? In 20? In 30? In 35? In 15? In 40? In 25? In 45?
8. How many nickels are there in 35 cents? In 20 cents? In 45 cents? In 30 cents? In 50 cents? In 40 cents? In 25 cents?
9. How many nickels and cents are there in 12 cents? In 18 cents? In 21 cents? In 29 cents? In 43 cents?
10. Which is more money, 9 nickels or 4 dimes? How much?
11. Which is more money, 5 nickels or 3 dimes? How much?
12. In a western town daily papers sell for 5 cents when bought one at a time. If subscribed for, the papers are delivered at the houses at 20c a week. How much is saved in one week of 7 days by subscribing for the paper? How much is saved in 4 weeks?



Tony has a fruit stand near the school where the children buy fruit for their lunch.

ORAL EXERCISES

1. How much do the oranges cost apiece? The apples? The bananas?
2. On Monday Tony sold 8 oranges, 6 apples, and 6 bananas. How much did he get for the oranges? For the apples? For the bananas?

Read the following and supply the missing numbers:

- | | |
|--|--|
| <p>3. Tuesday's sale:</p> <p>10 apples for cents</p> <p>9 oranges for cents</p> <p>8 bananas for cents</p> | <p>4. Wednesday's sale:</p> <p>7 apples for cents</p> <p>7 oranges for cents</p> <p>7 bananas for cents</p> |
| <p>5. Thursday's sale:</p> <p>10 oranges for cents</p> <p>9 bananas for cents</p> <p>8 apples for cents</p> | <p>6. Friday's sale:</p> <p>6 oranges for cents</p> <p>9 apples for cents</p> <p>10 bananas for cents</p> |

WRITTEN EXERCISES

Find the total received for each day's sale and for the four days' sale.

ORAL EXERCISES

1. Add 6 to each number in the table on page 74. Add by lines.
2. Add 6 to each of the following numbers: 73, 28, 46, 75, 57, 69, 26, 38, 45, 65, 78, 89.
3. Beginning with 1 count by 6's to 97.
4. Add 7 to each number in the table on page 74. Add by lines.
5. Add 7 to each of the following numbers: 88, 76, 67, 56, 45, 38, 78, 44, 37, 48, 54.
6. Beginning with 1 count to 99 by 7's.
7. Beginning with 3 count to 94 by 7's.

WRITTEN EXERCISES

Add:

1.	47	187	34	76	247	93
	94	84	282	49	196	65
	82	48	56	83	84	87
	<u>76</u>	<u>259</u>	<u>89</u>	<u>564</u>	<u>76</u>	<u>59</u>

2.	67	36	49	286	174	79
	78	72	57	241	291	82
	89	64	64	136	87	46
	84	89	87	159	156	97
	<u>65</u>	<u>43</u>	<u>38</u>	<u>82</u>	<u>248</u>	<u>85</u>

3.	94	13	681	47	268	134
	76	40	136	65	194	278
	58	74	99	94	182	291
	30	108	88	85	356	119
	<u>12</u>	<u>496</u>	<u>77</u>	<u>76</u>	<u>97</u>	<u>69</u>

Adding 9. In $27 + 9 = 36$ we notice that by adding 9 the number in tens' place is made one larger and the number in ones' place is made one smaller. Study these sums:

47	43	78	35	29	64	76
<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>
56	52	87	44	38	73	85

In each the number in ones' place is made 1 smaller and the number in tens' place 1 larger. 9 may be added in this way to any number unless its figure in ones' place is 0.

Adding 8. In $46 + 8 = 54$ we notice that by adding 8 the figure in ones' place is made 2 smaller and the figure in tens' place is made one larger. Study these sums:

76	53	69	45	17	34	68
<u>8</u>	<u>8</u>	<u>8</u>	<u>8</u>	<u>8</u>	<u>8</u>	<u>8</u>
84	61	77	53	25	42	76

In each the number in ones' place is made 2 smaller and the number in tens' place 1 larger. 8 may be added this way to any number unless its figure in ones' place is 0 or 1.

ORAL EXERCISES

1. In the way just explained add 9 to each number in the 3d, 4th, 5th, 6th, and 7th lines of the table on page 74.
2. Add 9 to each of the numbers 43, 37, 85, 76, 65, 73, 34, 57, 48, 29.
3. Tell how 9 may be added to a number.
4. In the way just explained add 8 to each number in the 3d, 4th, 5th, 6th, and 7th lines of the table on page 74.
5. Add 8 to each of the numbers 67, 34, 89, 23, 46, 55, 74, 82, 49, 65.
6. Tell how 8 may be added to a number.

ORAL EXERCISES

1. In 2874 what figure is in ones' place? What figure is in tens' place? What figure is in hundreds' place? What figure is in thousands' place?

The number 2874 is read, two thousand eight hundred seventy-four.

The number 45,374 is read, forty-five thousand three hundred seventy-four.

The number 287,940 is read, two hundred eighty-seven thousand nine hundred forty.

The comma is used to separate hundreds from thousands when the number contains more than four figures.

2. Read each of the following numbers:

7835	15,861	8376	93,847	41,183
5345	43,554	55,445	9482	77,391
9176	27,136	68,327	1495	23,632
8106	81,930	30,485	5274	367,804
9476	12,570	410,904	6500	219,086

WRITTEN EXERCISES

Write each of the following numbers:

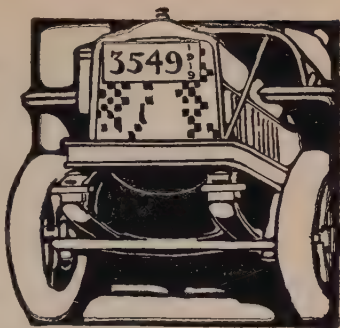
- Four thousand three hundred fifty-one;
- Three thousand six hundred thirty-nine;
- One thousand two hundred twenty-three;
- Two thousand one hundred seventeen;
- Seven thousand nine hundred eighty-five;
- Eight thousand three hundred forty-six;
- Four thousand eight hundred ninety-one;
- Six thousand four hundred fifty-two;
- Nine thousand seven hundred sixty-four;
- Five thousand five hundred seventy-eight;
- Twenty-four thousand two hundred twelve.

WRITTEN EXERCISES

1. Read the number on this automobile.

2. Notice with care the numbers on several automobiles. Write these numbers and read them.

3. Read the number on the house shown in the picture.



4. If you live in a city, what is the number of your house?

5. Which member of the class has the largest house number? Which has the smallest?

6. What is your telephone number? Find the telephone numbers of some of your friends.

7. What year is this? In what year were you born?

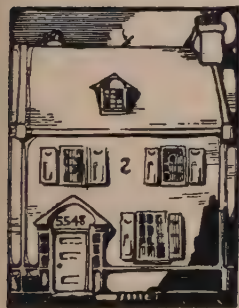
8. Read the following: There are 365 days in a year. There are 5280 feet in one mile. Lincoln was born in 1809 and died in 1865.

In the number 2300 there are 2 thousands, 3 hundreds, no tens and no ones. It is read, two thousand three hundred.

9. In 4000 there are how many thousands, hundreds, tens and ones?

10. How many thousands, hundreds, tens, and ones are there in each of the following: 7000, 8000, 9000, 6000, 5000, 4000, 3400, 2507, 3740,

4209, 3704, 4290? Read each of these numbers.



11. How many thousands, hundreds, tens, and ones are there in each of the following: 5071, 5309, 4063, 3004?



Play keeping a school lunch counter. Cut out little pieces of paper for toy money; or, if you have toy money, use that. Pay the cashier with this toy money. If the cashier gives you the wrong change, he is discharged and you become the new cashier if you notice the mistake before you leave the counter. Do not stay too long at the counter.

LIST OF PRICES

Soup.....	5¢	Milk.....	3¢
Ham Sandwich...	5¢	Baked Potato....	5¢
Chicken Sandwich.	8¢	Lamb Chop.....	12¢
Egg.....	5¢	Ice Cream.....	5¢
Bread and Butter.	2¢	Cake.....	5¢

ORAL EXERCISES

John orders soup, a chicken sandwich, and a glass of milk. How much is his bill? He gives the cashier 25 cents. The cashier says his bill is 16 cents. Is this right? When the cashier makes change he says: "Your bill is 16," then he puts down 4 cents and says "20," then 5 cents more and says "25." How much change does John get?

Tell what you would order from this bill and how much it would cost.

In a subtraction problem the larger number is called the **minuend**, the smaller is called the **subtrahend**. We subtract the subtrahend from the minuend.

Problem. John's father is 36 years old and his grandfather is 83 years old. How old was John's grandfather when his father was born? How do you find out?

We must subtract 36 from 83.

FIRST METHOD

Since 3 cannot be the sum of 6 and any other number, we add 10 to 3, making 13. Since 10 is added to the minuend, we must also add 10 to the subtrahend. We say "carry 1" to the subtrahend.

83	(minuend)	<i>Ones:</i> $13 = 6 + 7$. Write 7. Carry 1.
36	(subtrahend)	<i>Tens:</i> $8 = 1 \text{ (carried)} + 3 + 4$. Write 4.
47	(difference or remainder).	

In practice the 1 carried and 3 in the *subtrahend* are at once seen to be 4 without naming the two numbers 1 and 3.

SECOND METHOD

Since 6 ones cannot be taken from 3 ones, take 1 ten from the 8 tens, leaving 7 tens. $1 \text{ ten} + 3 \text{ ones} = 13 \text{ ones}$. We say:

83	<i>Ones:</i> 6 from 13 = 7 Write 7.
36	<i>Tens:</i> 3 from 7 = 4 Write 4.
47	The difference is 47.

WRITTEN EXERCISES

Subtract:

1.	53	74	92	83	52	74	85	37
	27	57	68	49	29	47	58	13
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Book I-8

Example 1. Subtract 43 from 90.

90	} First Method	<i>Ones:</i> $10 = 3 + 7$. Write 7. Carry 1.
43		<i>Tens:</i> $9 = 5 + 4$. Write 4.
47		

90	} Second Method	<i>Ones:</i> 3 from 10 = 7. Write 7.
43		<i>Tens:</i> 4 from 8 = 4. Write 4.
47		

WRITTEN EXERCISES

Subtract.

1.	80	70	90	60	30	40	90	70
	<u>63</u>	<u>35</u>	<u>52</u>	<u>41</u>	<u>14</u>	<u>24</u>	<u>37</u>	<u>48</u>
2.	40	70	60	90	80	50	80	60
	<u>17</u>	<u>51</u>	<u>24</u>	<u>37</u>	<u>58</u>	<u>27</u>	<u>36</u>	<u>29</u>

Example 2. Subtract 246 from 631.

631	} First Method	<i>Ones:</i> $11 = 6 + 5$. Write 5. Carry 1.
246		<i>Tens:</i> $13 = 5 + 8$. Write 8. Carry 1.
385		<i>Hundreds:</i> $6 = 3 + 3$. Write 3.
The difference or remainder is 385.		

631	} Second Method	<i>Ones:</i> 6 from 11 = 5. Write 5.
246		<i>Tens:</i> 4 from 12 = 8. Write 8.
385		<i>Hundreds:</i> 2 from 5 = 3. Write 3.

WRITTEN EXERCISES

Subtract:

1.	424	535	831	978	743	645
	<u>167</u>	<u>267</u>	<u>496</u>	<u>389</u>	<u>267</u>	<u>387</u>
2.	854	778	637	546	346	556
	<u>367</u>	<u>289</u>	<u>479</u>	<u>358</u>	<u>187</u>	<u>378</u>

Problem. In one school there are 1283 children and in another there are 1227 children. How many more children are there in the larger school than in the smaller one? How do you find out?

We must subtract 1227 from 1283.

$\begin{array}{r} 1283 \\ 1227 \\ \hline 56 \end{array}$	<i>Ones:</i> $13 = 7 + 6$. Write 6. Carry 1. <i>Tens:</i> $8 = 3 + 5$. Write 5.	}	First Method
--	--	---	--------------

$\begin{array}{r} 1283 \\ 1227 \\ \hline 56 \end{array}$	<i>Ones:</i> 7 from 13 = 6. Write 6. <i>Tens:</i> 2 from 7 = 5. Write 5.	}	Second Method
--	---	---	---------------

We notice at once that the figures in the third and fourth places will be zeros. Since 56 and 0056 represent the same numbers the zeros are not written down. When zeros are to be left out for this reason we must make sure that there is no figure other than zero to the left of them.

$\begin{array}{r} 4372 \\ 1367 \\ \hline 3005 \end{array}$	In this case the two zeros must be written since the figure 3 is to the left of them.
--	---

WRITTEN EXERCISES

Subtract:

- | | | | |
|--|--|--|--|
| 1. $\begin{array}{r} 5637 \\ 2752 \\ \hline \end{array}$ | 2. $\begin{array}{r} 1789 \\ 1737 \\ \hline \end{array}$ | 3. $\begin{array}{r} 2483 \\ 2438 \\ \hline \end{array}$ | 4. $\begin{array}{r} 6487 \\ 5378 \\ \hline \end{array}$ |
| 5. $\begin{array}{r} 3447 \\ 1989 \\ \hline \end{array}$ | 6. $\begin{array}{r} 8147 \\ 2139 \\ \hline \end{array}$ | 7. $\begin{array}{r} 4762 \\ 4658 \\ \hline \end{array}$ | 8. $\begin{array}{r} 2140 \\ 2062 \\ \hline \end{array}$ |
| 9. $\begin{array}{r} 8297 \\ 7289 \\ \hline \end{array}$ | 10. $\begin{array}{r} 4457 \\ 4358 \\ \hline \end{array}$ | 11. $\begin{array}{r} 2934 \\ 1896 \\ \hline \end{array}$ | 12. $\begin{array}{r} 2147 \\ 2096 \\ \hline \end{array}$ |
| 13. $\begin{array}{r} 1397 \\ 1329 \\ \hline \end{array}$ | 14. $\begin{array}{r} 3765 \\ 3687 \\ \hline \end{array}$ | 15. $\begin{array}{r} 3736 \\ 2892 \\ \hline \end{array}$ | 16. $\begin{array}{r} 5186 \\ 4946 \\ \hline \end{array}$ |

Problem. In one town there were 9241 people and in another 6092 people. How many more people were there in the larger town than in the smaller? How do you find out?

To find how many more people there are in the larger town subtract 6092 from 9241.

9241 6092 3149	<i>Ones:</i>	11 = 2 + 9. Write 9. Carry 1.	}	First Method
	<i>Tens:</i>	14 = 10 + 4. Write 4. Carry 1.		
	<i>Hundreds:</i>	2 = 1 + 1. Write 1.		
	<i>Thousands:</i>	9 = 6 + 3. Write 3.		

9241 6092 3149	<i>Ones:</i>	2 from 11 = 9. Write 9.	}	Second Method
	<i>Tens:</i>	9 from 13 = 4. Write 4.		
	<i>Hundreds:</i>	0 from 1 = 1. Write 1.		
	<i>Thousands:</i>	6 from 9 = 3. Write 3.		

To test the result add the remainder to the subtrahend. The result should be the minuend. To perform this addition do not copy the numbers again. Cover up the minuend with a sheet of paper and then add. Then compare your sum with the minuend.

WRITTEN EXERCISES

Subtract and test each remainder:

1. 914 <u>278</u>	2. 5236 <u>1978</u>	3. 2472 <u>1484</u>	4. 8112 <u>2789</u>
5. 4728 <u>1802</u>	6. 3915 <u>1200</u>	7. 3988 <u>2009</u>	8. 5461 <u>3007</u>
9. 3576 <u>2092</u>	10. 8774 <u>3902</u>	11. 4516 <u>2704</u>	12. 1645 <u>1504</u>
13. 1529 <u>809</u>	14. 2944 <u>1708</u>	15. 6214 <u>4008</u>	16. 31928 <u>20006</u>

Example. From 16002 subtract 9343.

16002	<i>Ones:</i>	12 = 3 + 9. Write 9. Carry 1.	} First Method
9343	<i>Tens:</i>	10 = 5 + 5. Write 5. Carry 1.	
6659	<i>Hundreds:</i>	10 = 4 + 6. Write 6. Carry 1.	
	<i>Thousands:</i>	16 = 10 + 6. Write 6.	

In this case take 1 thousand from the 6 thousand. But 1 thousand is 9 hundreds, 9 tens and 10 ones. Then

16002	<i>Ones:</i>	3 from 12 = 9. Write 9.	} Second Method
9343	<i>Tens:</i>	4 from 9 = 5. Write 5.	
6659	<i>Hundreds:</i>	3 from 9 = 6. Write 6.	
	<i>Thousands:</i>	9 from 15 = 6. Write 6.	

WRITTEN EXERCISES

Subtract and test each remainder:

- | | | | |
|--------------------------|--------------------------|---------------------------|---------------------------|
| 1. 438
<u>298</u> | 2. 790
<u>436</u> | 3. 5200
<u>3420</u> | 4. 748
<u>296</u> |
| 5. 4400
<u>1284</u> | 6. 2702
<u>1687</u> | 7. 4208
<u>1824</u> | 8. 5740
<u>2826</u> |
| 9. 3509
<u>2304</u> | 10. 4785
<u>1584</u> | 11. 15382
<u>12674</u> | 12. 29864
<u>12898</u> |
| 13. 13072
<u>6009</u> | 14. 8200
<u>2496</u> | 15. 4000
<u>2192</u> | 16. 13002
<u>6048</u> |
| 17. 3900
<u>2704</u> | 18. 18000
<u>9475</u> | 19. 8009
<u>2786</u> | 20. 21008
<u>18099</u> |
| 21. 4108
<u>2624</u> | 22. 1740
<u>898</u> | 23. 8760
<u>2407</u> | 24. 32040
<u>27409</u> |

WRITTEN EXERCISES

1. Columbus was born in the year 1446. He discovered America in 1492. How old was he at that time? How do you find out?
2. Washington was born in 1732. He was elected the first President of the United States in 1788. How old was he then? Washington died in the year 1799. How old was he at the time of his death?
3. Lincoln was born 1809 and died 1865. How old was he at the time of his death?
4. How old is your father now? Can you find out from this in what year he was born? How many years ago was that?
5. In what year were you born? How old will you be in 1937? In 1949?



This farmer is hauling hay to town. On this big scale they first weigh the wagon with the hay on, and then weigh it after the hay has been taken off. For several reasons the wagon does not always weigh the same.

From the weights given below find how much hay the farmer hauled on each load.

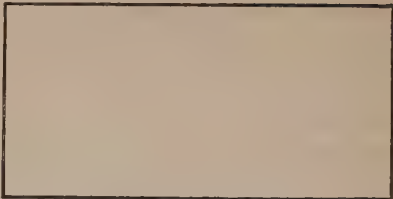
The man who does the weighing figures out how much hay there is on each load. In weighing heavy things of this sort amounts less than 10 pounds are disregarded. Hence, the last figure in the weights is always zero.

First Load

Second Load

1.	Monday	
	pounds	pounds
	Load and wagon 3640	Load and wagon 3720
	Wagon..... <u>1480</u>	Wagon..... <u>1470</u>
2.	Tuesday	
	pounds	pounds
	Load and wagon 3480	Load and wagon 3520
	Wagon..... <u>1490</u>	Wagon..... <u>1470</u>
3.	Wednesday	
	pounds	pounds
	Load and wagon 3620	Load and wagon 3760
	Wagon..... <u>1480</u>	Wagon..... <u>1490</u>
4.	Thursday	
	pounds	pounds
	Load and wagon 3740	Load and wagon 3580
	Wagon..... <u>1500</u>	Wagon..... <u>1490</u>
5.	Friday	
	pounds	pounds
	Load and wagon 3740	Load and wagon 3780
	Wagon..... <u>1480</u>	Wagon..... <u>1470</u>
6.	Saturday	
	pounds	pounds
	Load and wagon 3240	Load and wagon 2730
	Wagon..... <u>1510</u>	Wagon..... <u>1520</u>

ORAL AND WRITTEN EXERCISES

1. This figure represents a flower bed. If one inch represents 2 feet, how long is the flower bed? How wide is it?

2. A boy's garden patch is 6 feet long and 4 feet wide. Make a drawing of it, letting one inch represent one foot. How many inches long must the drawing be? How wide must it be?
3. A room is 16 feet long by 12 feet wide. Make a drawing of it, letting one inch represent 4 feet. How long and how wide must the drawing be?
4. How many yards wide is your schoolroom? How many yards long is it? Measure to the nearest yard.
5. Draw a figure to represent the schoolroom, letting 1 inch represent 1 yard. How long and how wide is the drawing?
6. Make a drawing to represent a schoolroom 6 yards wide and 8 yards long. If one inch represents a yard, how large must the drawing be?
7. A school assembly hall is 50 feet wide and 70 feet long. Make a drawing of it, letting one inch represent 10 feet. How long and how wide must the drawing be?
8. Measure your living room at home to the nearest yard. Make a drawing of it, letting one inch represent one yard.
9. Tell stories about making drawings of other things, and what you would make one inch represent in each case.



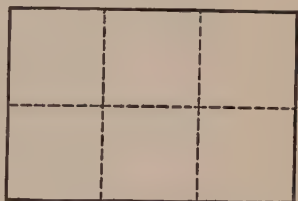
The children have been making fudge. They cut the fudge into inch squares.

ORAL AND WRITTEN EXERCISES

1. How many inches long is this pan? How many inches wide is it?
2. How many pieces of fudge are there in the pan? Can you tell without counting them? How?

A four-sided figure with square corners is called a **rectangle**.

3. Draw a rectangle 3 inches long and 2 inches wide. Into how many square inches can you divide it? What number fact does this represent?
4. Draw a rectangle 5 inches long and 3 inches wide. How many square inches are there in it? Can 3×5 be represented by this rectangle? 5×3 ?
5. Make a figure to represent 5×4 and 4×5 .
6. Make a figure to represent 5×7 and 7×5 .
7. How many pieces of fudge, each one inch square, can be cut from a pan 9 inches long and 5 inches wide?
8. If a rectangle is 6 inches long and 5 inches wide, how many square inches are there in it?
9. How many square inches are there in a rectangle 9 inches long and 5 inches wide? In a rectangle 10 inches long and 5 inches wide?



ORAL AND WRITTEN EXERCISES

1. How many working days are there in one week? In 2 weeks? In 3 weeks?

Two 6's are how many? Three 6's are how many? Four 6's are how many?

Read the following and supply the missing numbers:

- | | | |
|---------------|---------------|-------------------|
| 2. $6+6=?$ | 3. $12+6=?$ | 4. $18+6=?$ |
| $2\times 6=?$ | $3\times 6=?$ | $4\times 6=?$ |
| 5. $24+6=?$ | 6. $30+6=?$ | 7. $36\times 6=?$ |
| $5\times 6=?$ | $6\times 6=?$ | $7\times 6=?$ |
| 8. $42+6=?$ | 9. $48+6=?$ | 10. $54+6=?$ |
| $8\times 6=?$ | $9\times 6=?$ | $10\times 6=?$ |

11. Count to 60 by 6's, beginning with 6.

12. How many 6's are there in 18? In 36? In 54?
In 42? In 24? In 30? In 48? In 12?

13. Write the table of 6's, beginning with 6×1 , 6×2 .

Supply the missing numbers in the following:

- | | |
|-----------------------|-----------------------|
| 14. $? \times 4 = 4$ | 15. $1 \times 6 = ?$ |
| $2 \times ? = 8$ | $2 \times 6 = ?$ |
| $3 \times ? = 12$ | $? \times 6 = 18$ |
| $? \times 4 = 16$ | $? \times 6 = 24$ |
| 16. $5 \times ? = 20$ | 17. $5 \times 6 = ?$ |
| $6 \times 4 = ?$ | $6 \times ? = 36$ |
| $7 \times ? = 28$ | $? \times 6 = 42$ |
| $? \times 4 = 32$ | $9 \times ? = 54$ |
| 18. $9 \times 4 = ?$ | 19. $? \times 6 = 60$ |
| $10 \times ? = 40$ | $8 \times 6 = ?$ |
| $? \times 4 = 28$ | $? \times 4 = 20$ |
| $8 \times ? = 32$ | $4 \times ? = 24$ |

New Number Facts
$6 \times 6 = 36$
$7 \times 6 = 42$
$8 \times 6 = 48$
$9 \times 6 = 54$
$10 \times 6 = 60$

20. $8 \times ? = 48$

$? \times 6 = 54$

$? \times 6 = 60$

$6 \times ? = 42$

The number fact $2 \times 6 = 12$ in the table of 6's is also in the table of 2's. In that table it reads, $6 \times 2 = 12$.



From the rectangle in the margin we see that six 2's is the same as two 6's. That is, $2 \times 6 = 6 \times 2$.

ORAL AND WRITTEN EXERCISES

1. What number fact in the table of 6's is also in the table of 3's?

Draw a rectangle to show that $3 \times 6 = 6 \times 3$.

2. What number fact in the table of 6's is also in the table of 4's?

Draw a rectangle to show that $4 \times 6 = 6 \times 4$.

3. Make a list from all the tables you have studied of those number facts which cause you the most trouble. Practice on these until you know them well.

$4 \times 6 = 24$
$6 \times 4 = 24$
$24 \div 4 = 6$
$24 \div 6 = 4$
$\frac{1}{4}$ of $24 = 6$
$\frac{1}{6}$ of $24 = 4$

From the number fact $4 \times 6 = 24$, we know at once the five other number facts printed directly under it. It is important to understand this clearly, for if we do we shall have to remember only the first one of these six. Every number fact given in the tables carries with it

related number facts of this kind.

4. Write all the number facts *related* to each number fact in the table of 6's.
5. Make a set of question cards and answer cards for the table of 6's like those shown on page 103. Then play the game described on that page.

WRITTEN EXERCISES

Subtract and test each remainder:

- | | | | |
|---|--|---|---|
| 1. $\begin{array}{r} 1397 \\ - 898 \\ \hline \end{array}$ | 2. $\begin{array}{r} 4360 \\ - 1298 \\ \hline \end{array}$ | 3. $\begin{array}{r} 7542 \\ - 2789 \\ \hline \end{array}$ | 4. $\begin{array}{r} 3410 \\ - 1986 \\ \hline \end{array}$ |
| 5. $\begin{array}{r} 27400 \\ - 19086 \\ \hline \end{array}$ | 6. $\begin{array}{r} 19270 \\ - 4365 \\ \hline \end{array}$ | 7. $\begin{array}{r} 8024 \\ - 3698 \\ \hline \end{array}$ | 8. $\begin{array}{r} 4281 \\ - 2814 \\ \hline \end{array}$ |
| 9. $\begin{array}{r} 7602 \\ - 4794 \\ \hline \end{array}$ | 10. $\begin{array}{r} 2067 \\ - 1428 \\ \hline \end{array}$ | 11. $\begin{array}{r} 6027 \\ - 4631 \\ \hline \end{array}$ | 12. $\begin{array}{r} 3942 \\ - 2786 \\ \hline \end{array}$ |
| 13. $\begin{array}{r} 8340 \\ - 2764 \\ \hline \end{array}$ | 14. $\begin{array}{r} 6271 \\ - 4309 \\ \hline \end{array}$ | 15. $\begin{array}{r} 4012 \\ - 2713 \\ \hline \end{array}$ | 16. $\begin{array}{r} 1247 \\ - 464 \\ \hline \end{array}$ |
| 17. $\begin{array}{r} 24241 \\ - 12674 \\ \hline \end{array}$ | 18. $\begin{array}{r} 14005 \\ - 8427 \\ \hline \end{array}$ | 19. $\begin{array}{r} 5021 \\ - 2598 \\ \hline \end{array}$ | 20. $\begin{array}{r} 4728 \\ - 2060 \\ \hline \end{array}$ |
| 21. $\begin{array}{r} 2593 \\ - 1287 \\ \hline \end{array}$ | 22. $\begin{array}{r} 4385 \\ - 1847 \\ \hline \end{array}$ | 23. $\begin{array}{r} 5034 \\ - 2728 \\ \hline \end{array}$ | 24. $\begin{array}{r} 80040 \\ - 46829 \\ \hline \end{array}$ |

Example. From \$5.60 subtract \$1.85.

\$5.60 Subtract 185 from 560 in the usual way and then
1.85 place a decimal point in the remainder directly
 \$3.75 below the decimal point in the subtrahend and
 minuend.

Subtract and test each remainder:

- | | | | | |
|---|---|--|--|--|
| $\begin{array}{r} \$6.00 \\ - 2.45 \\ \hline \end{array}$ | $\begin{array}{r} \$3.92 \\ - 1.46 \\ \hline \end{array}$ | $\begin{array}{r} \$5.35 \\ - 2.75 \\ \hline \end{array}$ | $\begin{array}{r} \$8.25 \\ - 4.50 \\ \hline \end{array}$ | $\begin{array}{r} \$6.45 \\ - 2.65 \\ \hline \end{array}$ |
| $\begin{array}{r} \$7.90 \\ - 4.85 \\ \hline \end{array}$ | $\begin{array}{r} \$5.25 \\ - 2.68 \\ \hline \end{array}$ | $\begin{array}{r} \$12.40 \\ - 6.75 \\ \hline \end{array}$ | $\begin{array}{r} \$15.00 \\ - 8.50 \\ \hline \end{array}$ | $\begin{array}{r} \$10.00 \\ - 4.85 \\ \hline \end{array}$ |

Play the game on page 91, using subtraction problems.



ORAL AND WRITTEN EXERCISES

Work as many of these problems as you can without using pencil and paper.

1. How much has each sled been reduced in price? How do you find out?
2. How much has the \$3.00 sweater been reduced?
3. Roy's father bought him a sled for \$1.85, a sweater for \$1.90, and a cap for 25¢. How much did he pay for all these? How do you find out? How much change did he get from a five-dollar bill?
4. George bought a pair of skates for \$1.40, a sweater for \$1.90, and a cap for 25 cents. How much did these cost him? How much change did he get from a five-dollar bill?
5. Jane's mother bought her a sled for \$3.15, a sweater for \$2.25 and a pair of mittens for 25 cents. What change did she get from a ten-dollar bill? How do you find out?
6. Decide how you would spend \$5.00 at this store.

CHAPTER III

MULTIPLICATION

Problem. Charlie worked 21 examples each day for 4 days. How many examples did he work in all?

21 21 21 21 84	The number of examples may be found by adding four 21's. But it may be found more quickly by <i>multiplying</i> 21 by 4. Instead of adding four 1's we say $4 \times 1 = 4$. Instead of adding four 2's, we say $4 \times 2 = 8$.
--	---

21
4
84

In $4 \times 21 = 84$, 4 is called the **multiplier**, 21 is called the **multiplicand** and 84 the **product**.

Example 1. How many are three 42's, or 3×42 ?

42 (multiplicand) *Ones:* $3 \times 2 = 6$. Write 6.

3 (multiplier) *Tens:* $3 \times 4 = 12$. Write 12.

126 (product)

Also solve this problem by adding. Notice in what ways adding and multiplying are alike.

Example 2. Multiply 36 by 4.

36 (multiplicand) *Ones:* $4 \times 6 = 24$. Write 4, carry 2.

4 (multiplier) *Tens:* $4 \times 3 = 12$, $12 + 2$ (carried) = 14.

144 (product) Write 14.

WRITTEN EXERCISES

In this way multiply the following:

23	32	52	61	51	43	52	72
2	4	3	5	6	3	4	3
24	16	27	46	72	64	61	77
3	6	4	5	2	5	6	6

Example. Multiply \$.46 by 5.

\$.46 Multiply 46 by 5 as on the opposite page and place
 5 a decimal point in the product directly under the
\$.230 decimal point in the multiplicand. Write the
 sign \$ before the product.

WRITTEN EXERCISES

Multiply the following:

1. \$.38	\$.49	\$.98	\$.64	\$.91
<u> 5 </u>	<u> 4 </u>	<u> 6 </u>	<u> 3 </u>	<u> 6 </u>

2. \$.55	\$.79	\$.87	\$.40	\$.77
<u> 4 </u>	<u> 6 </u>	<u> 5 </u>	<u> 6 </u>	<u> 3 </u>

3. \$.54	\$.34	\$.43	\$.23	\$.36
<u> 8 </u>	<u> 6 </u>	<u> 7 </u>	<u> 9 </u>	<u> 6 </u>

PROBLEMS

1. At \$.35 a pound, what is the cost of 5 pounds of butter?
At this price, what is the cost of 8 pounds of butter.
2. John sold 6 Belgian hares at \$.75 apiece. How much did he get for them?
3. How many days do you go to school in a school year of 38 weeks?
4. If you spend 5 hours in school each day how many hours do you spend in school in 10 days? In 20 days? In 48 days? In 65 days?
5. How many quarts are there in 6 gallons? In 12 gallons?
In 24 gallons?
6. Each child in a class of 32 worked 6 examples. How many did they work all together?



ORAL EXERCISES

1. Roy buys 4 six-cent valentines. How much do they cost? What change does he get from a quarter?
2. Belle buys 7 four-cent valentines. How much do they cost? How much change does she get from three dimes?
3. Fanny buys 3 four-cent valentines. How much do they cost? What change does she get from 15¢?
4. Jane and Mary are sisters. Together they buy 9 six-cent valentines. How much do they cost?
5. Ethel sold 5 eight-cent valentines. How much does she get for them?
6. How much did she get for 8 four-cent valentines? For 6 seven-cent valentines? For 9 five-cent valentines? For 7 six-cent valentines?
7. Make up some stories about buying and selling valentines.
8. How many three-cent valentines can you buy for a quarter? What would be your change? How many four-cent valentines can you buy for a quarter?

<i>Loaf of bread</i>	5¢	<i>Half-pint of cream</i>	15¢
<i>A dozen eggs</i>	35¢	<i>Cake of soap</i>	5¢
<i>A quart of milk</i>	9¢	<i>Pound of butter</i>	38¢

ORAL EXERCISES

1. At the prices given above, how much must you pay for a loaf of bread and a quart of milk? What change should you get from 15 cents?
2. If you buy a dozen eggs, how much change should you get from 50 cents?
3. How much must you pay for a dozen eggs and a half-pint of cream? How much change would you get from a dollar?
4. How much must you pay for 2 quarts of milk? What change should you get from a quarter?
5. If you buy a pound of butter, how much change should you get from a half-dollar?
6. How much must you pay for one quart of milk and a half-pint of cream? How much change should you get from a quarter?
7. How much must you pay for a cake of soap and a pound of butter? How much change should you get from a half-dollar?
8. How much must you pay for a dozen eggs and a loaf of bread? How much change should you get from a half-dollar?
9. How much must you pay for one dozen eggs and 2 cakes of soap? How much change should you get from a half-dollar?

FEBRUARY, 1919

Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
-	-	-	-	-	-	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	-

ORAL AND WRITTEN EXERCISES

1. How many days are there in one week? In two weeks?
In three weeks? In four weeks?

2. Read and supply the missing numbers:

$7+7=?$

$14+7=?$

$21+7=?$

$2 \times 7=?$

$3 \times 7=?$

$4 \times 7=?$

$28+7=?$

$35+7=?$

$42+7=?$

$5 \times 7=?$

$6 \times 7=?$

$7 \times 7=?$

$49+7=?$

$56+7=?$

$63+7=?$

$8 \times 7=?$

$9 \times 7=?$

$10 \times 7=?$

3. Draw a rectangle to show that
 $2 \times 7 = 7 \times 2$.

Draw rectangles to show that
 $3 \times 7 = 7 \times 3$, $4 \times 7 = 7 \times 4$,
and so on.

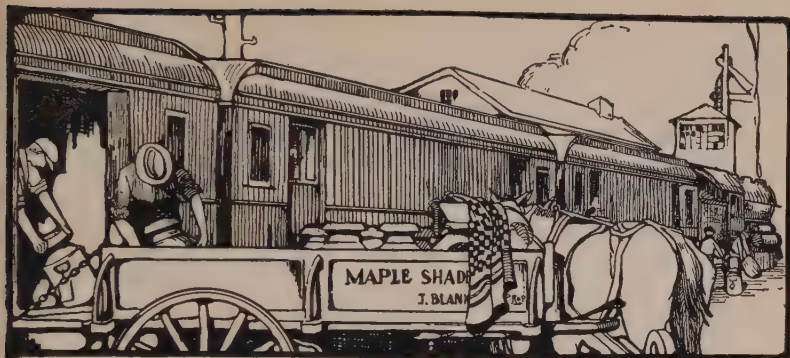
New Number Facts

$7 \times 7 = 49 \quad 9 \times 7 = 63$

$8 \times 7 = 56 \quad 10 \times 7 = 70$

4. Write the table of 7's beginning with 7×1 , 7×2 , and so on.

5. How many weeks are there in 42 days? In 63 days?
In 56 days? In 35 days? In 49 days? In 28 days?
In 21 days?



People who live in the city have their milk shipped in every day from the country. The farmers haul milk to the railway station every day of the week.

ORAL AND WRITTEN EXERCISES

1. If a farmer delivers 9 cans of milk every day, how many cans does he deliver in one week of 7 days?
2. One farmer delivers 6 cans of milk every day. How many does he deliver in 7 days? In 9 days? In 30 days?
3. One farmer lives 4 miles from the station. How far does he drive each day in delivering his milk? How far does he drive in one week?
4. A farmer delivers 7 cans of milk each containing 8 gallons. How many gallons is this? How many quarts?
5. When the train reaches the city there are 156 cans in the first car, 162 in the second, and 149 in the third. How many cans of milk does this train bring to the city?
6. A certain farmer delivers 53 cans of milk at the station in one week. How many gallons of milk is this if each can contains 8 gallons?

WRITTEN EXERCISES

Add and check by adding each column both ways:

1. 491	2. 715	3. 346	4. 823	5. 419
562	394	810	384	683
894	837	273	35	534
642	406	435	927	262
<u>366</u>	<u>12</u>	<u>674</u>	<u>43</u>	<u>547</u>

6. 743	7. 391	8. 746	9. 897	10. 978
564	728	689	648	698
928	473	743	759	476
<u>296</u>	<u>241</u>	<u>468</u>	<u>642</u>	<u>542</u>

Subtract and test each remainder:

1. 947	2. 876	3. 642	4. 754	5. 773
<u>489</u>	<u>382</u>	<u>253</u>	<u>462</u>	<u>298</u>
6. 843	7. 978	8. 789	9. 643	10. 543
<u>597</u>	<u>548</u>	<u>296</u>	<u>482</u>	<u>345</u>
11. 643	12. 781	13. 549	14. 923	15. 376
<u>195</u>	<u>394</u>	<u>178</u>	<u>778</u>	<u>198</u>

Multiply:

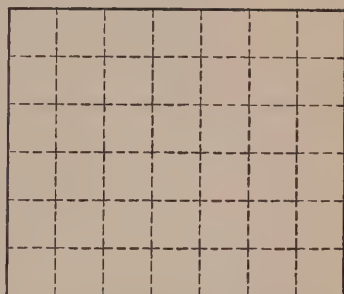
1. 32	2. 65	3. 28	4. 75	5. 23	6. 26
<u>4</u>	<u>3</u>	<u>2</u>	<u>3</u>	<u>7</u>	<u>5</u>
7. 78	8. 47	9. 39	10. 52	11. 64	12. 83
<u>6</u>	<u>4</u>	<u>5</u>	<u>7</u>	<u>6</u>	<u>3</u>
13. \$.25	14. \$.28	15. \$.15	16. \$.36	17. \$.56	
<u>3</u>	<u>5</u>	<u>6</u>	<u>4</u>	<u>3</u>	

ORAL EXERCISES

1. In the large rectangle
how many rows of
squares are there?
How many col-
umns? How many
squares?

 $\frac{1}{6}$ of 42


2. The long, narrow rect-
angle to the left is
equal to what part
of the large rect-
angle? $\frac{1}{7}$ of 42 is
how many?


 $\frac{1}{6}$ of 42

3. The long narrow rectangle above the large one is what
part of the large rectangle? $\frac{1}{6}$ of 42 is how many?
4. If the large rectangle is divided into 6
equal parts, how many squares are
there in each part? Point to one of
these parts. $42 \div 6 =$ how many?
5. In the same way show $42 \div 7$.

The above shows the number facts *re-*
lated to the number fact, $7 \times 6 = 42$; namely,
 6×7 , $\frac{1}{7}$ of 42, $\frac{1}{6}$ of 42, $42 \div 6$, $42 \div 7$.

$7 \times 6 = 42$
$6 \times 7 = 42$
$\frac{1}{7}$ of 42 = 6
$\frac{1}{6}$ of 42 = 7
$42 \div 7 = 6$
$42 \div 6 = 7$

WRITTEN EXERCISES

Give the number facts related to each of the following:
 4×7 , 9×7 , 3×7 , 5×7 . Draw a figure for each.

Drill in Fundamentals. Play a game like the one on
page 71. The teacher reads combinations from the tables,
such as 7×4 . The children write down the product of
each one and also all the number facts *related* to each one.

ORAL EXERCISES

You should now be able to give sums of the following without hesitating and without making a single mistake.

- | | | | | | | | | | |
|----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1. | 8 | 9 | 8 | 6 | 9 | 4 | 7 | 9 | 5 |
| | 8 | 5 | 4 | 5 | 6 | 7 | 9 | 9 | 7 |
| | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> |
| 2. | 2 | 3 | 8 | 9 | 4 | 5 | 8 | 6 | 8 |
| | 4 | 3 | 2 | 4 | 4 | 5 | 6 | 6 | 5 |
| | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> |
| 3. | 8 | 7 | 7 | 8 | 4 | 3 | 2 | 5 | 3 |
| | 7 | 6 | 7 | 5 | 6 | 8 | 9 | 3 | 2 |
| | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> |
| 4. | 7 | 4 | 2 | 6 | 3 | 6 | 2 | 5 | 2 |
| | 3 | 3 | 7 | 3 | 9 | 2 | 5 | 4 | 2 |
| | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> |
5. Add 8 to each of the following numbers: 35, 47, 28, 56, 89, 72, 63, 24, 67, 49, 89, 27, 45, 85, 23, 39, 85.
6. Add 9 to each of the following numbers: 13, 47, 52, 38, 44, 89, 75, 66, 18, 29, 62, 49, 83, 34.
7. Add 7 to each of the following numbers: 45, 27, 43, 59, 84, 68, 76, 53, 89, 78, 67, 54, 36, 45, 58.

WRITTEN EXERCISES

See how long it takes you to copy and subtract the following, writing neat figures and testing each result:

- | | | | | |
|-------------|-------------|-------------|-------------|-------------|
| 1. 643 | 2. 842 | 3. 731 | 4. 641 | 5. 834 |
| <u>456</u> | <u>384</u> | <u>448</u> | <u>388</u> | <u>568</u> |
| 6. 3512 | 7. 2512 | 8. 1816 | 9. 4642 | 10. 1746 |
| <u>1437</u> | <u>2296</u> | <u>1489</u> | <u>2489</u> | <u>1331</u> |
| 11. 4250 | 12. 8545 | 13. 2768 | 14. 5432 | 15. 6471 |
| <u>2450</u> | <u>3728</u> | <u>1938</u> | <u>2435</u> | <u>2984</u> |

The expression $6 \times 4 + 2$ means that we are to take $6 \times 4 = 24$ and add 2 to it.

That is, $6 \times 4 + 2 = 24 + 2 = 26$.

In finding this result think 24, 26 at once without thinking the rest of the process.

To find $7 \times 8 + 5$ think 56, 61.

Combinations like these are needed in multiplying, and you should learn to find the results rapidly.

ORAL EXERCISES

Read and supply the missing numbers:

$3 \times 4 + 1 = ?$	$5 \times 6 + 2 = ?$	$2 \times 7 + 1 = ?$
$7 \times 6 + 4 = ?$	$4 \times 5 + 3 = ?$	$8 \times 3 + 5 = ?$
$8 \times 4 + 3 = ?$	$6 \times 7 + 4 = ?$	$5 \times 9 + 6 = ?$
$7 \times 5 + 2 = ?$	$3 \times 4 + 2 = ?$	$9 \times 2 + 8 = ?$
$6 \times 8 + 4 = ?$	$7 \times 7 + 5 = ?$	$8 \times 4 + 6 = ?$
$8 \times 7 + 5 = ?$	$2 \times 3 + 4 = ?$	$7 \times 5 + 6 = ?$
$4 \times 7 + 2 = ?$	$6 \times 7 + 8 = ?$	$9 \times 4 + 8 = ?$
$6 \times 9 + 4 = ?$	$2 \times 2 + 1 = ?$	$6 \times 4 + 3 = ?$
$7 \times 9 + 6 = ?$	$4 \times 9 + 5 = ?$	$7 \times 3 + 4 = ?$
$5 \times 9 + 6 = ?$	$4 \times 4 + 3 = ?$	$9 \times 3 + 6 = ?$
$7 \times 8 + 7 = ?$	$5 \times 5 + 2 = ?$	$7 \times 4 + 5 = ?$
$6 \times 9 + 3 = ?$	$6 \times 6 + 4 = ?$	$8 \times 3 + 7 = ?$

WRITTEN EXERCISES

Multiply:

34	45	82	53	45	36	42	53
<u>3</u>	<u>6</u>	<u>7</u>	<u>5</u>	<u>4</u>	<u>6</u>	<u>7</u>	<u>3</u>
47	88	72	63	57	47	93	87
<u>4</u>	<u>7</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>5</u>	<u>6</u>

ORAL AND WRITTEN EXERCISES

1. Supply the missing numbers in the following:

$8+8=?$	$16+8=?$	$24+8=?$
$2\times 8=?$	$3\times 8=?$	$4\times 8=?$
$32+8=?$	$40+8=?$	$48+8=?$
$5\times 8=?$	$6\times 8=?$	$7\times 8=?$
$56+8=?$	$64+8=?$	$72+8=?$
$8\times 8=?$	$9\times 8=?$	$10\times 8=?$

New Number Facts

$$8\times 8=64 \quad 9\times 8=72 \quad 10\times 8=80$$

- How many 8's are there in 32? In 16? In 40? In 24? In 48? In 64? In 80? In 72?
- Count by 8's from 8 to 80.
- Draw a figure to show that $2\times 8=8\times 2$.
- Draw a figure to show that $7\times 8=8\times 7$.
- Use a figure like that on page 133 to show the product 7×8 and also to show the related number facts $\frac{1}{7}$ of 56, $\frac{1}{8}$ of 56, $56\div 7$, and $56\div 8$.
- Give the number facts related to each of the products: 6×8 , 5×8 , 9×8 , 8×8 , 3×8 , 4×8 , 10×8 .
- Write the table of 8's, beginning with 8×1 , 8×2 , and so on.

Multiply the following:

9.	84	37	43	97	58	78	43	73
	<u>8</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>5</u>	<u>7</u>	<u>4</u>	<u>8</u>
10.	53	57	49	32	76	64	59	45
	<u>5</u>	<u>6</u>	<u>8</u>	<u>8</u>	<u>7</u>	<u>6</u>	<u>4</u>	<u>7</u>

ORAL EXERCISES

1. The teacher asks Mary to find two numbers whose product is 10. Mary says $2 \times 5 = 10$. Is this right?
2. The teacher asks Jane to find two numbers whose product is 21. Jane says $7 \times 3 = 21$. Is this right?
3. Find two numbers whose product is 6.
4. Find two numbers whose product is 14.
5. Find two numbers whose product is 15.
6. For each of the following numbers, give two numbers of which it is the product. If you know the multiplication tables well as far as you have studied them you will be able to do this very rapidly.

4, 8, 9, 10, 14, 21, 28, 30, 32, 35, 42,
45, 48, 49, 50, 56, 60, 63, 64, 70, 72, 80.

Since $4 \times 6 = 24$, and $3 \times 8 = 24$, we see that 24 is the product of 4 and 6 and also of 3 and 8.

Again, $12 = 2 \times 6$ and also $12 = 3 \times 4$.

7. For each of the following numbers find two pairs of numbers whose product it is: 12, 16, 18, 20, 24, 36, 40.

WRITTEN EXERCISES

Multiply:

94	67	48	37	93	75	82	69
<u>8</u>	<u>7</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>7</u>	<u>6</u>	<u>5</u>

Drill in Fundamentals. Play a game like that on page 71. The teacher will read numbers from the list under Example 6. For each such number the children will write a pair of numbers of which it is the product.

ORAL AND WRITTEN EXERCISES



1. For what is a peck measure used? A bushel measure? Where do you find them?

These children get sawdust and fill a quart measure. They pour this into

a peck measure and keep on until the peck measure is full. In this way they find how many quarts there are in a peck.

In the same way they find how many pecks there are in a bushel.

2. How many quarts are there in a peck? How many pecks in a bushel? How many quarts in a bushel?
3. If a grocer sells peas at 6 cents a quart, how much does he get for one peck of peas?



Eight quarts = one peck (8 qt. = 1 pk.)
 Four pecks = one bushel (4 pk. = 1 bu.)
 Thirty-two quarts = one bushel (32 qt. = 1 bu.)

4. If the grocer sells apples at 35 cents a peck, how much does he get for one bushel of apples?
5. A grocer sells a bushel of peas at 7 cents a quart. How much does he get for it?

ORAL EXERCISES

1. How many quarts are there in 2 pecks? In 3 pecks?
2. How many quarts are there in 4 pecks? In 5 pecks?
3. Read the following and supply the missing numbers:
There are quarts in 6 pecks.
There are quarts in 8 pecks.
There are quarts in 9 pecks.
There are quarts in 7 pecks.
4. How many pecks are there in 16 quarts? In 32 quarts?
In 24 quarts?
5. If one peck of apples costs 25¢ how much would a bushel cost?
6. If one quart of shelled peas costs 8¢ how much do 2 quarts cost? 6 quarts? 9 quarts? 5 quarts? 3 quarts? 8 quarts? 7 quarts? 4 quarts?
7. How many pecks are there in 40 quarts? In 48 quarts?
8. How many pecks are there in $\frac{1}{2}$ of a bushel? In $\frac{1}{4}$ of a bushel?
9. How many quarts are there in $\frac{1}{4}$ of a bushel? In $\frac{1}{8}$ of a bushel?
10. How many pecks are there in 4 bushels? In 6 bushels?
In 8 bushels?
11. If apples are sold for \$1.00 a bushel, how much is one peck worth at the same rate?
12. If peas are sold at 40 cents a peck, how much is one quart worth at the same rate?
13. Tell number stories about selling by the bushel, by the peck, and by the quart.

Ralph wants to save money to buy a camera which costs \$5.00. His bank holds just that amount in dimes.



ORAL AND WRITTEN EXERCISES

1. How many dimes are there in 1 dollar? In 2 dollars? In 3 dollars? In 4 dollars? In 5 dollars?
 2. How many dollars and cents are there in 12 dimes? In 17 dimes? In 24 dimes? In 38 dimes?
 3. How many dimes does Ralph's bank hold?
 4. The first month Ralph puts 14 dimes into the bank. How many dollars and cents is this? How much more must he get to have \$5.00? How do you find out?
- | |
|-------------|
| \$5.00 |
| <u>1.40</u> |
5. Two months later Ralph has twenty-seven dimes. How many dollars and cents is this? How many more dollars and cents must he get to have \$5.00?
 6. When Ralph has 38 dimes, how many dollars and cents has he? How many dollars and cents does he lack to fill the bank?
 7. When Ralph has 47 dimes, how many dollars and cents has he? How much does he lack?
 8. After buying the camera Ralph gets a case for \$1.25 and films for 50 cents. How much do the camera, case, and films cost altogether? How do you find out?
 9. On Arbor Day Ralph took 12 pictures, and paid 4 cents apiece for getting them developed and printed. How much did these pictures cost him for developing and printing?
 10. For July 4th Ralph bought 3 rolls of films for 25 cents each. How much did these cost?

ORAL AND WRITTEN EXERCISES

1. How much is the fare on a street car?

2. How much will it cost to go down town and back again?

3. How much car-fare does Mr. Smith pay each week of 6 days going to and from his office?



4. How much does one of Mr. Smith's children pay going to and from school each day, if the fare for a child is 3 cents each way? How much car-fare do the two children pay in one day?

5. At 12 cents a day, how much do these children pay each week (5 days) when they go to school?

6. Mr. Thomas lives in a small town 18 miles from the city. How far does he ride on the train going to the city and back again? How do you find out?

7. If Mr. Thomas pays 32 cents fare for one round trip, how much fare does he pay in one week, if he goes to the city 6 times?

8. In one month Mrs. Thomas makes 8 trips to the city. How much fare does she pay in all if she pays 43 cents for each trip?

9. Tell number stories about paying street-car fare.

10. See if you can find out why Mrs. Thomas pays higher fare on the train than does Mr. Thomas.

ORAL EXERCISES

1. At 8 cents apiece, how much do 6 grapefruits cost?
2. John lives 4 blocks from the schoolhouse. How many blocks does he walk each day going to school and back again? How many blocks does he walk in 2 days? In 5 days? In 7 days?
3. A man gives 8 cents to each of his 4 children. How many cents does he give to all of them?
4. A lady pays \$42 for 6 dining-room chairs. How much does each chair cost?
5. At \$72 for 8 parlor chairs, how much does one chair cost?
6. In a schoolroom there are 6 rows of desks with eight desks in each row. How many desks are there in the room?
7. Spelling books are sold for 7 cents apiece. How much do 7 children pay for their spellers?
8. At 7 cents apiece, how many spellers can be bought for 63¢? How many for 56¢?
9. If John has 32 marbles and you have one-fourth as many, how many have you?
10. A motor boat goes 8 miles an hour. How far can it go in 6 hours? In 9 hours?
11. A man having 36 cows, sells $\frac{1}{4}$ of them. How many does he sell?
12. A girl having 25 cents spends $\frac{1}{5}$ of it for candy, how much does she spend for candy? How much change does she get from the quarter?

James had a garden in which he worked after school.

ORAL AND WRITTEN EXERCISES

1. James bought 3 packages of lettuce seed at 5 cents a package, 3 packages of radish seed at 5 cents a package, 1 pound of onion sets for 15 cents, and 1 package



Lettuce seed . .	15¢
Radish seed . .	15¢
Onion sets	15¢
Beet seed	<u>5¢</u>

of beet seed at 5 cents a package. How much does he pay for lettuce seed? How much does he pay for radish seed? How much does he pay for all these?

2. He bought these tools: a hoe for 60 cents, a rake for 50 cents, a hand weeder for 15 cents, and a watering can for 40 cents. How much did his tools cost him?
3. James worked from Tuesday afternoon to Friday afternoon, one hour each day, spading his garden. In how many hours did he do the spading? If his time is worth 5¢ an hour, how much did the spading amount to?
4. James began his planting at 9 o'clock Saturday morning, and finished at 12 o'clock noon. At 5¢ an hour, how much did the planting amount to?
5. He spent one hour each day except Sunday taking care of the garden. At 5¢ an hour, how much did this amount to in one week?
6. At 30 cents a week how much will the care of the garden amount to in 3 weeks? In 4 weeks?

ORAL AND WRITTEN EXERCISES

1. Read and supply the missing numbers in the following:

$9+9=? \quad 18+9=? \quad 27+9=?$

$2 \times 9=? \quad 3 \times 9=? \quad 4 \times 9=?$

$36+9=? \quad 45+9=? \quad 54+9=?$

$5 \times 9=? \quad 6 \times 9=? \quad 7 \times 9=?$

$63+9=? \quad 72+9=? \quad 81+9=?$

$8 \times 9=? \quad 9 \times 9=? \quad 10 \times 9=?$

2. How many 9's are there in

36? In 54? In 72? In 27?

In 18? In 45? In 63? In 90?

In 81?

New Number Facts

$9 \times 9 = 81 \quad 10 \times 9 = 90$

3. Count by 9's from 9 to 90.
4. Draw a figure to show that $2 \times 9 = 9 \times 2$.
5. Draw a figure to show that $5 \times 9 = 9 \times 5$.
6. Use a figure like that on page 133 to show $\frac{1}{6}$ of 54, $\frac{1}{9}$ of 54, $54 \div 6$, $54 \div 9$.
7. Give the number facts related to each of the products:
 9×9 , 4×9 , 8×9 , 6×9 , 2×9 .
8. Give the number facts related to each of the products:
 7×9 , 5×9 , 3×9 .
9. Write the table of 9's, beginning with 9×1 , 9×2 , and so on.
10. In what other tables do we find 2×9 (9×2)? In what table do we find 3×9 (9×3)?
11. In what other tables do we find the combinations 4×9 , 5×9 , 6×9 , 7×9 , 8×9 ?
12. Play a game like that on page 103, using the table of 9's.

ORAL EXERCISES

1. Measure a yardstick with a foot-rule to see how many feet make a yard.
2. Draw on the board a square one yard on each side. Into how many square feet can you divide it?

Nine square feet = one square yard
(9 sq. ft. = 1 sq. yd.)

3. How many square feet are there in 5 square yards? In 3 sq. yd.? In 2 sq. yd.?
4. How many square feet are there in 9 sq. yds.? In 7 sq. yds.? In 4 sq. yds.?
5. How many square feet are there in 6 sq. yds.? In 8 sq. yds.? In 10 sq. yds.?
6. How many square yards are there in 18 sq. ft.? In 36 sq. ft.? In 81 sq. ft.? In 63 sq. ft.? In 45 sq. ft.? In 72 sq. ft.? In 27 sq. ft.? In 54 sq. ft.?
7. Supply the missing numbers in the following:

$8 \times 8 + 6 = ? \quad 9 \times 9 + 6 = ? \quad 8 \times 9 + 5 = ?$

$9 \times 6 + 5 = ? \quad 5 \times 3 + 2 = ? \quad 4 \times 4 + 2 = ?$

$7 \times 8 + 3 = ? \quad 6 \times 3 + 4 = ? \quad 9 \times 2 + 6 = ?$

$8 \times 4 + 6 = ? \quad 7 \times 3 + 3 = ? \quad 8 \times 3 + 5 = ?$

$7 \times 7 + 4 = ? \quad 4 \times 6 + 2 = ? \quad 7 \times 4 + 5 = ?$

$8 \times 2 + 3 = ? \quad 9 \times 3 + 5 = ? \quad 8 \times 4 + 6 = ?$

$3 \times 7 + 2 = ? \quad 6 \times 5 + 3 = ? \quad 7 \times 5 + 4 = ?$

$6 \times 7 + 4 = ? \quad 6 \times 6 + 3 = ? \quad 9 \times 4 + 8 = ?$

$6 \times 5 + 4 = ? \quad 6 \times 7 + 4 = ? \quad 9 \times 5 + 6 = ?$

$3 \times 9 + 2 = ? \quad 7 \times 7 + 4 = ? \quad 8 \times 6 + 5 = ?$

$4 \times 7 + 1 = ? \quad 3 \times 3 + 1 = ? \quad 9 \times 6 + 7 = ?$

$4 \times 3 + 1 = ? \quad 8 \times 7 + 5 = ? \quad 8 \times 8 + 3 = ?$

WRITTEN EXERCISES

Multiply:

1.	$\begin{array}{r} 63 \\ 8 \end{array}$	$\begin{array}{r} 49 \\ 6 \end{array}$	$\begin{array}{r} 98 \\ 9 \end{array}$	$\begin{array}{r} 32 \\ 8 \end{array}$	$\begin{array}{r} 76 \\ 7 \end{array}$	$\begin{array}{r} 25 \\ 9 \end{array}$	$\begin{array}{r} 98 \\ 6 \end{array}$	$\begin{array}{r} 82 \\ 6 \end{array}$
2.	$\begin{array}{r} 98 \\ 4 \end{array}$	$\begin{array}{r} 79 \\ 6 \end{array}$	$\begin{array}{r} 91 \\ 8 \end{array}$	$\begin{array}{r} 73 \\ 6 \end{array}$	$\begin{array}{r} 47 \\ 3 \end{array}$	$\begin{array}{r} 75 \\ 9 \end{array}$	$\begin{array}{r} 47 \\ 7 \end{array}$	$\begin{array}{r} 64 \\ 5 \end{array}$
3.	$\begin{array}{r} 87 \\ 2 \end{array}$	$\begin{array}{r} 96 \\ 8 \end{array}$	$\begin{array}{r} 48 \\ 4 \end{array}$	$\begin{array}{r} 54 \\ 9 \end{array}$	$\begin{array}{r} 76 \\ 7 \end{array}$	$\begin{array}{r} 73 \\ 8 \end{array}$	$\begin{array}{r} 86 \\ 5 \end{array}$	$\begin{array}{r} 97 \\ 9 \end{array}$

Multiply 847 by 6.

847 *Ones:* $6 \times 7 = 42$. Write 2, carry 4.

$\begin{array}{r} 6 \\ 5082 \end{array}$ *Tens:* $6 \times 4 = 24$, $24 + 4$ (carried) = 28. Write 8,
carry 2.

Hundreds: $6 \times 8 = 48$, $48 + 2$ (carried) = 50. Write 50.
The product is 5082.

WRITTEN EXERCISES

In this manner multiply the following:

1. $\begin{array}{r} 497 \\ 6 \end{array}$	2. $\begin{array}{r} 537 \\ 8 \end{array}$	3. $\begin{array}{r} 839 \\ 4 \end{array}$	4. $\begin{array}{r} 691 \\ 8 \end{array}$	5. $\begin{array}{r} 386 \\ 4 \end{array}$
6. $\begin{array}{r} 978 \\ 6 \end{array}$	7. $\begin{array}{r} 129 \\ 8 \end{array}$	8. $\begin{array}{r} 173 \\ 4 \end{array}$	9. $\begin{array}{r} 765 \\ 7 \end{array}$	10. $\begin{array}{r} 249 \\ 9 \end{array}$
11. $\begin{array}{r} 2543 \\ 3 \end{array}$	12. $\begin{array}{r} 784 \\ 6 \end{array}$	3. $\begin{array}{r} 925 \\ 7 \end{array}$	14. $\begin{array}{r} 4287 \\ 2 \end{array}$	15. $\begin{array}{r} 983 \\ 9 \end{array}$
16. $\begin{array}{r} 768 \\ 8 \end{array}$	17. $\begin{array}{r} 819 \\ 7 \end{array}$	18. $\begin{array}{r} 693 \\ 9 \end{array}$	19. $\begin{array}{r} 2176 \\ 4 \end{array}$	20. $\begin{array}{r} 847 \\ 5 \end{array}$
21. $\begin{array}{r} 726 \\ 5 \end{array}$	22. $\begin{array}{r} 493 \\ 7 \end{array}$	23. $\begin{array}{r} 871 \\ 8 \end{array}$	24. $\begin{array}{r} 396 \\ 6 \end{array}$	25. $\begin{array}{r} 576 \\ 7 \end{array}$

ORAL EXERCISES

Read the following and supply the missing numbers:

- | | | |
|----------------------|----------------------|----------------------|
| 1. $8 \times ? = 72$ | 2. $8 \times 9 = ?$ | 3. $? \times 6 = 48$ |
| $7 \times ? = 35$ | $? \times 6 = 42$ | $? \times 6 = 54$ |
| $10 \times ? = 90$ | $9 \times ? = 63$ | $? \times 7 = 56$ |
| $9 \times ? = 72$ | $? \times 5 = 25$ | $? \times 5 = 40$ |
| $? \times 9 = 54$ | $9 \times 7 = ?$ | $3 \times ? = 27$ |
| 4. $4 \times ? = 36$ | 5. $8 \times ? = 32$ | 6. $9 \times 6 = ?$ |
| $4 \times ? = 28$ | $? \times 10 = 80$ | $? \times 6 = 30$ |
| $? \times 4 = 12$ | $8 \times ? = 48$ | $? \times 9 = 81$ |
| $5 \times ? = 20$ | $? \times 5 = 35$ | $8 \times 9 = ?$ |
| $5 \times ? = 30$ | $? \times 6 = 36$ | $? \times 4 = 32$ |
| 7. $6 \times 9 = ?$ | 8. $9 \times 9 = ?$ | 9. $? \times 7 = 70$ |
| $? \times 9 = 27$ | $8 \times 8 = ?$ | $10 \times ? = 60$ |
| $8 \times ? = 24$ | $7 \times ? = 42$ | $8 \times ? = 64$ |
| $8 \times ? = 56$ | $? \times 9 = 36$ | $6 \times ? = 24$ |
| $9 \times 8 = ?$ | $? \times 7 = 63$ | $? \times 7 = 49$ |

Try to think of a game to play, using the number combinations on this page.

Make a list of those combinations that cause the most trouble, and play a game with them.

WRITTEN EXERCISES

Multiply:

- | | | | | |
|---|---|---|---|---|
| 1. $\begin{array}{r} 247 \\ 8 \end{array}$ | 2. $\begin{array}{r} 453 \\ 7 \end{array}$ | 3. $\begin{array}{r} 727 \\ 8 \end{array}$ | 4. $\begin{array}{r} 835 \\ 9 \end{array}$ | 5. $\begin{array}{r} 943 \\ 6 \end{array}$ |
| 6. $\begin{array}{r} 55 \\ 5 \end{array}$ | 7. $\begin{array}{r} 373 \\ 9 \end{array}$ | 8. $\begin{array}{r} 85 \\ 8 \end{array}$ | 9. $\begin{array}{r} 578 \\ 6 \end{array}$ | 10. $\begin{array}{r} 54 \\ 9 \end{array}$ |
| 11. $\begin{array}{r} 571 \\ 9 \end{array}$ | 12. $\begin{array}{r} 887 \\ 7 \end{array}$ | 13. $\begin{array}{r} 647 \\ 8 \end{array}$ | 14. $\begin{array}{r} 499 \\ 6 \end{array}$ | 15. $\begin{array}{r} 273 \\ 4 \end{array}$ |

Example 1. Multiply 34 by 26.

34 *First Step:* Multiply 34 by 6 and place first figure
26 directly under the 6.

204 $6 \times 4 = 24$. Write 4. Carry 2.

68 $6 \times 3 = 18$. $18 + 2$ (carried) = 20. Write 20.

884 *Second Step:* Multiply 34 by 2 and place first figure
directly under the 2.

$2 \times 4 = 8$. Write 8.

$2 \times 3 = 6$. Write 6.

Third Step: Add the two products.

The two products 204 and 68 are called "partial products." We can then say that the third step is: "add the partial products."

Notice very carefully that the first figure in each partial product is written directly below the number with which we multiply. Thus, the first figure in the first product is written right under the 6 (in ones' place), and the first figure in the second product is written right under the 2 (in tens' place). The real reason for this is a little hard to understand, and will be given in a later book.

Example 2. Multiply 87 by 39.

87 *First Step:* State what this step is.

39 $9 \times 7 = 63$. Write 3. Carry 6.

783 $9 \times 8 = 72$. $72 + 6 = 78$. Write 78.

261 *Second Step:* State what this step is.

3393 $3 \times 7 = 21$. Write 1. Carry 2.

$3 \times 8 = 24$. $24 + 2 = 26$. Write 26.

Third Step: State what this step is.

WRITTEN EXERCISES

Multiply:

38	62	82	76	84	59	67	89
<u>21</u>	<u>54</u>	<u>27</u>	<u>38</u>	<u>75</u>	<u>87</u>	<u>35</u>	<u>34</u>

We know that $2 \times 0 = 0$, because $0 + 0 = 0$. For this same reason, zero multiplied by any number is zero.

Thus if there are 0 (not any) children in each room of your school on Sunday, there are 0 (not any) children in all the rooms.

Example 1. Multiply 307 by 9.

307 *Ones:* $9 \times 7 = 63$. Write 3. Carry 6.
9 *Tens:* $9 \times 0 = 0$. $0 + 6$ (carried) $= 6$. Write 6.
2763 *Hundreds:* $9 \times 3 = 27$. Write 27.

Example 2. Multiply 307 by 29.

307 Multiply by 9 as in Example 1. Then multiply by 2,
29 being careful to place the first figure of the product
2763 in tens' place. Add the products.
614
8903

WRITTEN EXERCISES

Multiply the following:

- | | | | | |
|----------------------|----------------------|----------------------|----------------------|----------------------|
| 1. 408
<u>26</u> | 2. 506
<u>49</u> | 3. 308
<u>42</u> | 4. 405
<u>84</u> | 5. 607
<u>46</u> |
| 6. 604
<u>95</u> | 7. 802
<u>69</u> | 8. 404
<u>75</u> | 9. 607
<u>84</u> | 10. 304
<u>47</u> |
| 11. 456
<u>38</u> | 12. 592
<u>76</u> | 13. 876
<u>43</u> | 14. 207
<u>34</u> | 15. 196
<u>58</u> |
| 16. 614
<u>86</u> | 17. 509
<u>34</u> | 18. 891
<u>29</u> | 19. 724
<u>13</u> | 20. 887
<u>47</u> |
| 21. 397
<u>45</u> | 22. 814
<u>72</u> | 23. 647
<u>29</u> | 24. 584
<u>93</u> | 25. 692
<u>87</u> |

ORAL EXERCISES

1. Read the following and supply the missing numbers:

$$\begin{array}{cccc} 2 \times 10 = ? & 3 \times 10 = ? & 4 \times 10 = ? & 5 \times 10 = ? \\ 6 \times 10 = ? & 7 \times 10 = ? & 8 \times 10 = ? & 9 \times 10 = ? \end{array}$$

Which of these combinations have been learned in the other tables?

2. $90 + 10 = ?$ $10 \times 10 = ?$

3. How many 10's are there in 30? In 70?
In 90? In 20? In 100? In 40? In
80? In 50? In 60?

New Num-
ber Fact
 $10 \times 10 = 100$

4. Give the number facts related to each of the following products: 5×10 , 7×10 , 9×10 , 4×10 , 10×10 .

5. Give the number facts related to each of the following products: 3×10 , 8×10 , 6×10 , 9×10 .

6. How many tens are there in each of the following: 110, 120, 130, 140, 150, 160, 170, 180, 190, 200.

We notice from the tables that to multiply a number by 10 we write one zero to the right of it. That is, $10 \times 8 = 80$, $10 \times 7 = 70$, $10 \times 4 = 40$, and so on. Any number is multiplied by 10 this way. Thus, $10 \times 16 = 160$, $10 \times 24 = 240$.

7. Multiply by 10 each of the numbers 12, 13, 14, 15, 16, 17, 21, 27, 31, 40.

8. Multiply by 10 each of the numbers 37, 48, 51, 60, 73, 49, 82, 67, 85.

WRITTEN EXERCISES

Write the table of 10's beginning with 10×1 , 10×2 , and so on.

Play a game like that on page 103, using tables including the table of 10's.

ORAL EXERCISES

To multiply a number by 20, we may first multiply it by 2 and then by 10. That is, we may multiply by 2 and then annex one zero.

Thus, $20 \times 6 = 10 \times 12 = 120.$ ^a

1. In this manner find the products of the following:

$20 \times 7,$	$20 \times 9,$	$20 \times 12,$	$20 \times 16,$
$20 \times 5,$	$20 \times 4,$	$20 \times 3,$	$20 \times 11.$
$20 \times 6,$	$20 \times 8,$	$20 \times 15,$	$20 \times 25.$

To multiply a number by 30 we may first multiply it by 3 and then by 10; that is, we may multiply it by 3 and then annex a zero to the right.

To multiply by 40, multiply by 4 and annex one zero, and so on.

2. Give a rule for multiplying a number by 50. By 60. By 70. By 80. By 90.

Read the following and supply the missing number:

3. $40 \times 4 = ?$	4. $50 \times 4 = ?$	5. $60 \times 4 = ?$
$40 \times 5 = ?$	$50 \times 5 = ?$	$60 \times 5 = ?$
$40 \times 6 = ?$	$50 \times 6 = ?$	$60 \times 6 = ?$
$40 \times 7 = ?$	$50 \times 7 = ?$	$60 \times 7 = ?$
$40 \times 8 = ?$	$50 \times 8 = ?$	$60 \times 8 = ?$
$40 \times 9 = ?$	$50 \times 9 = ?$	$60 \times 9 = ?$
6. $70 \times 4 = ?$	7. $80 \times 4 = ?$	8. $80 \times 4 = ?$
$70 \times 5 = ?$	$80 \times 5 = ?$	$90 \times 5 = ?$
$70 \times 6 = ?$	$80 \times 6 = ?$	$90 \times 6 = ?$
$70 \times 7 = ?$	$80 \times 7 = ?$	$90 \times 7 = ?$
$70 \times 8 = ?$	$80 \times 8 = ?$	$90 \times 8 = ?$
$70 \times 9 = ?$	$80 \times 9 = ?$	$90 \times 9 = ?$

9. See if you can make a rule for multiplying by 200.

MULTIPLYING NUMBERS ENDING IN ZEROS

The multiplication of numbers ending in one or more zeros is shown in the examples on this page.

EXAMPLES

Example 1. Multiply 288 by 160.

$$\begin{array}{r} 288 \\ 160 \\ \hline 1728 \\ 288 \\ \hline 46080 \end{array}$$

Multiply 288 by 16 and then multiply the product by 10 by annexing one zero to the right.

Notice that the 160 is written so as to make the 6 come directly under the 8.

Example 2. Multiply 480 by 240.

$$\begin{array}{r} 480 \\ 240 \\ \hline 1920 \\ 960 \\ \hline 115200 \end{array}$$

Multiply 480 by 24, and then multiply the product by 10 by annexing 1 zero to the right.

Example 3. Multiply 270 by 1800.

$$\begin{array}{r} 270 \\ 1800 \\ \hline 2160 \\ 270 \\ \hline 486000 \end{array}$$

Multiply 270 by 18, and then multiply the product by 100 by annexing 2 zeros to the right.

Notice very carefully how the numbers are written down before we start multiplying.

Example 4. Multiply \$9.65 by 18.

$$\begin{array}{r} \$9.65 \\ 18 \\ \hline 7720 \\ 965 \\ \hline \$173.70 \end{array}$$

Multiply 965 by 18 in the usual manner. Then place a decimal point between tens' and hundreds' places, and a dollar sign before the first figure in the product.

ORAL EXERCISES

Tell how to find the products 370×600 , 747×800 .

WRITTEN EXERCISES

On the previous page you will see how these examples should be written before you start multiplying.

Multiply:

1. 384 <u>50</u>	2. 566 <u>35</u>	3. 729 <u>80</u>	4. 593 <u>70</u>	5. 365 <u>40</u>
6. 240 <u>80</u>	7. 670 <u>50</u>	8. 380 <u>90</u>	9. 190 <u>70</u>	10. 260 <u>60</u>
11. 890 <u>860</u>	12. 970 <u>300</u>	13. 240 <u>800</u>	14. 628 <u>76</u>	15. 907 <u>260</u>

See how many minutes it takes you to copy and multiply the next 12 examples.

16. \$7.89 <u>78</u>	17. \$8.79 <u>89</u>	18. \$9.08 <u>78</u>	19. \$10.49 <u>98</u>
20. \$5.67 <u>24</u>	21. \$8.35 <u>45</u>	22. \$5.35 <u>64</u>	23. \$9.45 <u>59</u>
24. \$7.29 <u>35</u>	25. \$4.05 <u>47</u>	26. \$7.63 <u>38</u>	27. \$6.87 <u>56</u>

Add:

28. 762 895 347 653 609 432 <u>891</u>	29. 139 247 380 436 278 540 <u>270</u>	30. 859 243 672 294 288 642 <u>590</u>	31. 230 680 254 623 810 390 <u>582</u>	32. 126 387 258 342 573 619 <u>284</u>
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WRITTEN EXERCISES



1. This farmer has 5 horses, which are worth \$175.00 apiece. How much are all the horses worth? How do you find out?
2. The farmer has 27 cows worth \$75 apiece. How much are these cows worth? How do you find out?
3. During March and April his hens laid 3 dozen eggs each day. How many dozen did they lay in two months of 61 days?
4. At 22 cents a dozen, how much are 183 dozen eggs worth?
5. At 58 bushels to the acre, how many bushels of corn does the farmer raise on 68 acres?
6. The farmer sold 34 hogs at \$21.50 apiece. How much did he get for his hogs?
7. The farmer hauls milk to the station. If he gets \$1.36 a can for his milk, how much does he get for 8 cans?
8. During one month he delivered 57 cans of milk. At \$1.36 a can, how much was this milk worth?

WRITTEN EXERCISES

9. The farmer sold 245 bushels of potatoes at 45 cents a bushel. How much did he get for his potatoes?

Multiply 245 by 45. Then place the dollar sign before the number and place a decimal point between tens' and hundreds' place.

245
45
1225
980
\$110.25

10. At 95 cents a bushel how much did he receive for 485 bushels of wheat?
11. The farmer sold 985 bushels of oats at 38 cents a bushel. How much did he get for the oats?
12. At 57 cents a bushel how much did he receive for 535 bushels of corn?
13. How much did the farmer get for 9 young pigs at \$5.50 apiece?
14. The farmer paid a hired man \$1.35 a day for 84 days' work. How much did he pay the man?
15. A mowing machine cost \$42.50, a corn harvester \$115.00, and a plow \$18.50. How much did all these cost?
16. How much more did the corn harvester cost than the mowing machine? How much more did it cost than the plow?
17. The farmer spent 14 days putting up his hay. Counting the use of a team, machinery, his own time, and that of the hired man, he figured that the total value of this work was \$7.85 a day. What was the total cost of putting up the hay?
18. The farmer began to harvest the corn 16 weeks after planting. How many days was that?
19. Make other farm problems and solve them.

Example 1. Multiply 532 by 647.

$\begin{array}{r} 532 \\ 647 \\ \hline 3724 \\ 2128 \\ 3192 \\ \hline 344204 \end{array}$	<i>First step:</i> Multiply 532 by 7 and place the first figure of the product directly under the 7. <i>Second step:</i> Multiply 532 by 4 and place the first figure of the product directly under the 4. <i>Third step:</i> Multiply 532 by 6 and place the first figure of the product directly under the 6. <i>Fourth step:</i> Add the partial products.
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Example 2. Multiply 387 by 406.

$\begin{array}{r} 387 \\ 406 \\ \hline 2322 \\ 1548 \\ \hline 157122 \end{array}$	<i>First step:</i> Multiply 387 by 6 and place the first figure of the product directly under the 6. <i>Second step:</i> Multiply 387 by 4 and place the first figure of the product directly under the 4. <i>Third step:</i> Add the partial products.
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WRITTEN EXERCISES

Multiply:

- | | | | |
|---|---|---|---|
| 1. $\begin{array}{r} 897 \\ 408 \\ \hline \end{array}$ | 2. $\begin{array}{r} 378 \\ 609 \\ \hline \end{array}$ | 3. $\begin{array}{r} 720 \\ 807 \\ \hline \end{array}$ | 4. $\begin{array}{r} 416 \\ 207 \\ \hline \end{array}$ |
| 5. $\begin{array}{r} 356 \\ 905 \\ \hline \end{array}$ | 6. $\begin{array}{r} 108 \\ 464 \\ \hline \end{array}$ | 7. $\begin{array}{r} 764 \\ 327 \\ \hline \end{array}$ | 8. $\begin{array}{r} 406 \\ 894 \\ \hline \end{array}$ |
| 9. $\begin{array}{r} 204 \\ 485 \\ \hline \end{array}$ | 10. $\begin{array}{r} 320 \\ 907 \\ \hline \end{array}$ | 11. $\begin{array}{r} 961 \\ 402 \\ \hline \end{array}$ | 12. $\begin{array}{r} 579 \\ 785 \\ \hline \end{array}$ |
| 13. $\begin{array}{r} 578 \\ 294 \\ \hline \end{array}$ | 14. $\begin{array}{r} 842 \\ 309 \\ \hline \end{array}$ | 15. $\begin{array}{r} 654 \\ 397 \\ \hline \end{array}$ | 16. $\begin{array}{r} 779 \\ 284 \\ \hline \end{array}$ |
| 17. $\begin{array}{r} 547 \\ 194 \\ \hline \end{array}$ | 18. $\begin{array}{r} 206 \\ 307 \\ \hline \end{array}$ | 19. $\begin{array}{r} 190 \\ 286 \\ \hline \end{array}$ | 20. $\begin{array}{r} 587 \\ 264 \\ \hline \end{array}$ |
| 21. $\begin{array}{r} 475 \\ 419 \\ \hline \end{array}$ | 22. $\begin{array}{r} 760 \\ 234 \\ \hline \end{array}$ | 23. $\begin{array}{r} 219 \\ 286 \\ \hline \end{array}$ | 24. $\begin{array}{r} 487 \\ 265 \\ \hline \end{array}$ |

ORAL EXERCISES

Read and supply the missing numbers:

1. $6 \times 8 = ?$ 2. $9 \times 7 = ?$ 3. $8 \times 9 = ?$

$8 \times 6 = ?$ $7 \times 9 = ?$ $9 \times 8 = ?$

$6 \overline{)48} = ?$ $7 \overline{)63} = ?$ $8 \overline{)72} = ?$

$8 \overline{)48} = ?$ $9 \overline{)63} = ?$ $9 \overline{)72} = ?$

$\frac{1}{6}$ of 48 = ? $\frac{1}{7}$ of 63 = ? $\frac{1}{8}$ of 72 = ?

$\frac{1}{8}$ of 48 = ? $\frac{1}{9}$ of 63 = ? $\frac{1}{9}$ of 72 = ?

4. Give similar combinations for 6×9 , 7×8 , and 7×6 .

Give the quotients in the following:

5. $9 \overline{)36}$ $4 \overline{)36}$ $5 \overline{)30}$ $6 \overline{)30}$ $3 \overline{)21}$ $7 \overline{)21}$

6. $9 \overline{)81}$ $9 \overline{)72}$ $8 \overline{)72}$ $8 \overline{)80}$ $9 \overline{)90}$ $5 \overline{)10}$

7. $10 \overline{)90}$ $10 \overline{)80}$ $10 \overline{)70}$ $7 \overline{)70}$ $10 \overline{)100}$ $10 \overline{)50}$

8. $8 \overline{)56}$ $7 \overline{)56}$ $6 \overline{)54}$ $9 \overline{)54}$ $6 \overline{)60}$ $10 \overline{)60}$

9. $6 \overline{)48}$ $8 \overline{)48}$ $5 \overline{)45}$ $9 \overline{)45}$ $6 \overline{)42}$ $7 \overline{)42}$

10. $10 \overline{)40}$ $4 \overline{)40}$ $5 \overline{)40}$ $8 \overline{)40}$ $6 \overline{)36}$ $4 \overline{)32}$

11. $8 \overline{)32}$ $3 \overline{)30}$ $10 \overline{)30}$ $4 \overline{)28}$ $7 \overline{)28}$ $3 \overline{)27}$

12. $9 \overline{)27}$ $6 \overline{)24}$ $4 \overline{)24}$ $3 \overline{)24}$ $8 \overline{)24}$ $6 \overline{)18}$

Supply the missing numbers in the following:

13. $\frac{1}{6}$ of 54 = ? $\frac{1}{9}$ of 54 = ? $\frac{1}{8}$ of 64 = ? $\frac{1}{7}$ of 49 = ?

14. $\frac{1}{8}$ of 48 = ? $\frac{1}{6}$ of 48 = ? $\frac{1}{7}$ of 42 = ? $\frac{1}{6}$ of 42 = ?

15. $\frac{1}{7}$ of 63 = ? $\frac{1}{9}$ of 63 = ? $\frac{1}{9}$ of 72 = ? $\frac{1}{8}$ of 72 = ?

16. $\frac{1}{8}$ of 32 = ? $\frac{1}{4}$ of 32 = ? $\frac{1}{7}$ of 28 = ? $\frac{1}{4}$ of 28 = ?

17. $\frac{1}{6}$ of 18 = ? $\frac{1}{3}$ of 18 = ? $\frac{1}{7}$ of 21 = ? $\frac{1}{3}$ of 21 = ?



ORAL EXERCISES

1. How many pounds do you weigh?
2. How much does the heaviest child in your class weigh? How much more than you does this child weigh?
3. Who is the lightest child in your class? How much less than you does this child weigh?
4. If you gain on an average 8 pounds a year from now until you are 18 years old, how much will you weigh then? At this rate of gain, how much will the heaviest child in your class weigh when 18 years old?

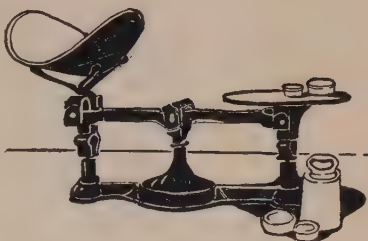
One pound = 16 ounces (1 lb. = 16 oz.)

5. How many ounces are there in 2 pounds? In 3 pounds? In 4 pounds? In $\frac{1}{2}$ pound? In $\frac{1}{4}$ pound?
6. If a baby gains on an average 4 ounces each week, how long will it take it to gain one pound?
7. How long will it take this baby to gain five pounds?
8. How much will the baby gain in one month (4 weeks)? In 4 months of four weeks each? In 10 months of four weeks each? In 12 months of four weeks each?
9. How much will a baby weigh when it is one year old if it weighs 8 pounds at birth and gains (on an average) 4 ounces a week (one pound in four weeks)?

Since there are 52 weeks in the year, and since 4 is contained 13 times in 52, the baby will gain how much?

ORAL EXERCISES

1. How many ounces are there in a half-pound of candy?
2. If candy is 40 cents a pound, how many ounces do you get for 20 cents?



If you buy candy or if you go in with your mother to buy meat be sure to watch the scale to see that you get full weight. How can you tell?

3. If candy is 40 cents a pound, how much candy do you get for 10 cents?
4. If you buy candy worth 60 cents a pound, how much do you pay for 8 ounces? For 4 ounces?
5. If round steak costs 24 cents a pound, how much will one and a half pounds cost?
6. How many ounces are there in $\frac{3}{4}$ of a pound? How much is $\frac{3}{4}$ of a pound of round steak worth at 24 cents a pound?
7. If boiled ham costs 40 cents a pound, how much is 4 ounces worth? 8 ounces? 12 ounces?
8. If pecans cost 80 cents a pound, how many ounces do you get for 40 cents? For 10 cents?
9. If pecans cost 80 cents a pound, how much is one ounce worth? 3 ounces? 5 ounces?
10. If salted almonds cost \$1.00 a pound, how much do 8 ounces cost? 4 ounces? 12 ounces?
11. Name other articles that are sold by the pound.

WRITTEN EXERCISES

Add:

1. 786	2. 826	3. 278	4. 685	5. 517
236	670	865	609	420
476	469	694	870	896
823	342	846	768	782
197	678	197	594	349
<u>938</u>	<u>465</u>	<u>849</u>	<u>637</u>	<u>678</u>
6. 934	7. 692	8. 869	9. 948	10. 857
689	786	646	796	295
467	879	597	327	768
418	542	153	672	567
296	375	214	891	890
<u>734</u>	<u>246</u>	<u>321</u>	<u>432</u>	<u>123</u>

Subtract:

1. 4620	2. 8734	3. 7943	4. 6809	5. 8005
<u>1786</u>	<u>2985</u>	<u>2864</u>	<u>3978</u>	<u>3647</u>
6. 6573	7. 7890	8. 9768	9. 5847	10. 5463
<u>1984</u>	<u>5936</u>	<u>5879</u>	<u>2938</u>	<u>2958</u>
11. 8307	12. 6495	13. 7820	14. 4790	15. 7382
<u>2768</u>	<u>3687</u>	<u>1786</u>	<u>2897</u>	<u>5090</u>

Multiply:

1. 436	2. 368	3. 603	4. 947	5. 89
<u>57</u>	<u>64</u>	<u>86</u>	<u>78</u>	<u>68</u>
6. 840	7. 490	8. 674	9. 208	10. 680
<u>75</u>	<u>49</u>	<u>69</u>	<u>37</u>	<u>90</u>

ORAL EXERCISES

Supply the missing numbers:

1. $4 \times 9 = ?$	$36 \div 4 = ?$	$\frac{1}{4}$ of $36 = ?$
$9 \times 4 = ?$	$36 \div 9 = ?$	$\frac{1}{9}$ of $36 = ?$
2. $6 \times 7 = ?$	$42 \div 6 = ?$	$\frac{1}{6}$ of $42 = ?$
$7 \times 6 = ?$	$42 \div 7 = ?$	$\frac{1}{7}$ of $42 = ?$
3. $9 \times 7 = ?$	$63 \div 9 = ?$	$\frac{1}{9}$ of $63 = ?$
$7 \times 9 = ?$	$63 \div 7 = ?$	$\frac{1}{7}$ of $63 = ?$
4. $5 \times 9 = ?$	$45 \div 5 = ?$	$\frac{1}{5}$ of $45 = ?$
$9 \times 5 = ?$	$45 \div 9 = ?$	$\frac{1}{9}$ of $45 = ?$
5. $7 \times 8 = ?$	$56 \div 7 = ?$	$\frac{1}{7}$ of $56 = ?$
$8 \times 7 = ?$	$56 \div 8 = ?$	$\frac{1}{8}$ of $56 = ?$
6. $9 \times 8 = ?$	$72 \div 9 = ?$	$\frac{1}{9}$ of $72 = ?$
$8 \times 9 = ?$	$72 \div 8 = ?$	$\frac{1}{8}$ of $72 = ?$
7. $6 \times 9 = ?$	$54 \div 6 = ?$	$\frac{1}{6}$ of $54 = ?$
$9 \times 6 = ?$	$54 \div 9 = ?$	$\frac{1}{9}$ of $54 = ?$
8. $4 \times 7 = ?$	$28 \div 4 = ?$	$\frac{1}{4}$ of $28 = ?$
$7 \times 4 = ?$	$28 \div 7 = ?$	$\frac{1}{7}$ of $28 = ?$
9. $9 \times 3 = ?$	$27 \div 9 = ?$	$\frac{1}{9}$ of $27 = ?$
$3 \times 9 = ?$	$27 \div 3 = ?$	$\frac{1}{3}$ of $27 = ?$
10. $3 \times 7 = ?$	$21 \div 3 = ?$	$\frac{1}{3}$ of $21 = ?$
$7 \times 3 = ?$	$21 \div 7 = ?$	$\frac{1}{7}$ of $21 = ?$
11. $8 \times 4 = ?$	$32 \div 8 = ?$	$\frac{1}{8}$ of $32 = ?$
$4 \times 8 = ?$	$32 \div 4 = ?$	$\frac{1}{4}$ of $32 = ?$
12. $6 \times 8 = ?$	$48 \div 6 = ?$	$\frac{1}{6}$ of $48 = ?$
$8 \times 6 = ?$	$48 \div 8 = ?$	$\frac{1}{8}$ of $48 = ?$
13. $5 \times 3 = ?$	$15 \div 5 = ?$	$\frac{1}{5}$ of $15 = ?$
$3 \times 5 = ?$	$15 \div 3 = ?$	$\frac{1}{3}$ of $15 = ?$

ORAL EXERCISES



1. Which hand on the watch is called the hour hand? The minute hand? The second hand?
2. How long does it take the minute hand to go around once? How long does it take the hour hand?
3. How long does it take the second hand to go around the small circle?
4. How many minute spaces does the hour hand pass over in one hour? In 2 hours?
5. How many minute spaces does the hour hand pass over in one hour?
6. How many minutes are there in one hour?
7. How many times does the second hand go around while the minute hand goes around once?
8. How many seconds are there in one minute?
9. How many hours are there in a whole day and night?

60 seconds = 1 minute	(60 sec. = 1 min.)
60 minutes = 1 hour	(60 min. = 1 hr.)
24 hours = 1 day	(24 hr. = 1 da.)

Instead of second or seconds we sometimes write sec., instead of minute or minutes we write min., instead of hour or hours we write hr., and instead of day or days we write da.

10. About what time do you go to bed at night? At what time do you get up?
11. A child 8 years old should get 10 hours of sleep. Do you get more or less sleep than this?

A CLASS—Third Grade.

Time	Studies	Recites
9 : 00– 9 : 10	Opening Exercises	
9 : 10– 9 : 25	Reading	
9 : 25– 9 : 40		Reading
9 : 40– 9 : 55	History	
9 : 55–10 : 10		History
10 : 10–10 : 30	Arithmetic	
10 : 30–10 : 45	Recess	
10 : 45–11 : 00		Music
11 : 00–11 : 20		Arithmetic
11 : 20–11 : 40	Spelling	
11 : 40–12 : 00		Reading
NOON		
1 : 30– 1 : 40		Spelling
1 : 40– 1 : 55		Writing
1 : 55– 2 : 15	Reading	
2 : 15– 2 : 35		Reading
2 : 35– 2 : 45	Exercises	
2 : 45– 3 : 00	Recess	
3 : 00– 3 : 30	{ Drawing 3 days Construction work, 2 days	

ORAL EXERCISES

- How many minutes are there from 9 : 55 to ten o'clock?
From 9 : 55 to 10 : 10?
- How many minutes are there from 1 : 55 to 2 : 15?
- How many minutes are given to the study of each subject in this program? To recesses? To noon?
- How many minutes are given to recite on each subject?

WRITTEN EXERCISES

Copy and supply the quotients. Use the form $4 \overline{)12}^3$

1. $6 \overline{)42}$ $7 \overline{)42}$ $8 \overline{)56}$ $7 \overline{)56}$ $7 \overline{)49}$ $7 \overline{)63}$

2. $8 \overline{)48}$ $5 \overline{)40}$ $6 \overline{)48}$ $8 \overline{)40}$ $4 \overline{)32}$ $7 \overline{)28}$

We have here 14 marks arranged in $//// //$ 3 groups of 4 each and 2 left over. From this we see that in 14 there are three 4's and 2 over. We may also learn this without using objects, because we know there are exactly three 4's in 12, and 14 is 2 greater than 12. We say that when 14 is divided by 4 we get 3 and 2 left over. We call the 3 the *quotient* and the 2 the *remainder*.

Since there is a remainder 14 is not **exactly divisible** by 3. When there is no remainder the division is **exact**.

Example. Find the quotient and remainder when 28 is divided by 5.

$\begin{array}{r} 5, \text{ remainder } 3 \\ 5 \overline{)28} \end{array}$
--

We know that $5 \times 5 = 25$, and that therefore there are exactly five 5's in 25. Since 28 is 3 greater than 25 we get 5 as the *quotient* and 3 as the *remainder*.

ORAL EXERCISES

Give the quotients and remainders in the following:

3. $6 \overline{)37}$ $7 \overline{)45}$ $8 \overline{)36}$ $5 \overline{)43}$ $2 \overline{)13}$ $3 \overline{)17}$

4. $9 \overline{)57}$ $4 \overline{)37}$ $6 \overline{)27}$ $9 \overline{)68}$ $8 \overline{)53}$ $7 \overline{)58}$

5. $6 \overline{)43}$ $4 \overline{)35}$ $6 \overline{)27}$ $9 \overline{)68}$ $8 \overline{)53}$ $7 \overline{)58}$

6. $7 \overline{)29}$ $7 \overline{)32}$ $7 \overline{)38}$ $7 \overline{)43}$ $7 \overline{)48}$ $7 \overline{)61}$

ORAL EXERCISES

Give the quotients and remainders:

1. $6 \overline{)19}$	7 $\overline{)23}$	8 $\overline{)20}$	9 $\overline{)22}$	7 $\overline{)17}$
2. $6 \overline{)22}$	5 $\overline{)24}$	7 $\overline{)26}$	8 $\overline{)27}$	9 $\overline{)25}$
3. $9 \overline{)28}$	7 $\overline{)29}$	8 $\overline{)30}$	5 $\overline{)24}$	4 $\overline{)27}$
4. $9 \overline{)31}$	7 $\overline{)32}$	8 $\overline{)34}$	6 $\overline{)35}$	4 $\overline{)30}$
5. $7 \overline{)36}$	6 $\overline{)33}$	5 $\overline{)32}$	4 $\overline{)34}$	9 $\overline{)35}$
6. $8 \overline{)37}$	7 $\overline{)39}$	9 $\overline{)38}$	6 $\overline{)39}$	9 $\overline{)37}$
7. $7 \overline{)40}$	5 $\overline{)38}$	4 $\overline{)39}$	6 $\overline{)40}$	9 $\overline{)42}$

WRITTEN EXERCISES

Multiply:

1. $\begin{array}{r} 970 \\ 90 \\ \hline \end{array}$	2. $\begin{array}{r} 870 \\ 80 \\ \hline \end{array}$	3. $\begin{array}{r} 360 \\ 70 \\ \hline \end{array}$	4. $\begin{array}{r} 530 \\ 40 \\ \hline \end{array}$	5. $\begin{array}{r} 480 \\ 30 \\ \hline \end{array}$
6. $\begin{array}{r} 760 \\ 45 \\ \hline \end{array}$	7. $\begin{array}{r} 294 \\ 81 \\ \hline \end{array}$	8. $\begin{array}{r} 316 \\ 48 \\ \hline \end{array}$	9. $\begin{array}{r} 590 \\ 55 \\ \hline \end{array}$	10. $\begin{array}{r} 362 \\ 49 \\ \hline \end{array}$
11. $\begin{array}{r} \$3.97 \\ 88 \\ \hline \end{array}$	12. $\begin{array}{r} \$9.47 \\ 36 \\ \hline \end{array}$	13. $\begin{array}{r} \$7.48 \\ 27 \\ \hline \end{array}$	14. $\begin{array}{r} \$8.94 \\ 86 \\ \hline \end{array}$	15. $\begin{array}{r} \$3.76 \\ 46 \\ \hline \end{array}$
16. $\begin{array}{r} \$1.47 \\ 45 \\ \hline \end{array}$	17. $\begin{array}{r} \$4.90 \\ 28 \\ \hline \end{array}$	18. $\begin{array}{r} \$5.68 \\ 35 \\ \hline \end{array}$	19. $\begin{array}{r} \$2.25 \\ 86 \\ \hline \end{array}$	20. $\begin{array}{r} \$2.50 \\ 79 \\ \hline \end{array}$
21. $\begin{array}{r} \$5.45 \\ 12 \\ \hline \end{array}$	22. $\begin{array}{r} \$3.65 \\ 14 \\ \hline \end{array}$	23. $\begin{array}{r} \$1.85 \\ 29 \\ \hline \end{array}$	24. $\begin{array}{r} \$2.45 \\ 65 \\ \hline \end{array}$	25. $\begin{array}{r} \$4.89 \\ 62 \\ \hline \end{array}$

Play a game like that on page 103. Use mixed cards from all the tables. First let the boys play against the girls. Then let one side of the room play against the other.

The number of days in the months of the year are:

January	31	July	31
February	28	August	31
March	31	September	30
April	30	October	31
May	31	November	30
June	30	December	31

The number of days in each month can easily be remembered when we notice that, beginning with January, every alternate month has 31 days, except that July and August both have 31 days. All the other months have 30 days, except February, which has 28 days. In a leap year, which comes every fourth year, February has 29 days.

OLD RHYME

Thirty days hath September,
 April, June and November.
 All the rest have thirty-one
 Save February, which alone
 Has twenty-eight; and one day more
 We add to it each year in four.

WRITTEN EXERCISES

1. How many months of the year have 31 days each?
 How many days are there in all these months?
2. How many months of the year have 30 days each? How
 many days are there in all these months?
3. From the number of days in the months, find out how
 many days there are in one year.
4. Can you find how many days there are in a leap-year?
 How?

WRITTEN AND ORAL EXERCISES

1. How many days are there in 52 weeks?
2. How many days less than one year is this?
3. How many weeks are there in one year? (Count only whole weeks.)
4. How many years old were you on your last birthday?
5. How many weeks old were you on your last birthday? (Count 52 weeks for each year.)
6. How many weeks do you go to school each year?
7. How many grades are there in your school?
8. If you spend one school year in each grade, how many weeks will you spend altogether in your school?
9. How many days old were you on your seventh birthday? (7×365 are how many?)
10. How many days do you go to school each week?
11. How many days do you go to school in a school year of 38 weeks if you do not miss any?
12. If you miss 14 days in one year, how many days do you attend school that year?
13. On an average, how many hours do you sleep each night? How many hours do you sleep in one week? In one month? In one year?
14. How many hours do you spend in school in one day? In one week of 5 school days? In a month of 20 school days?
15. If you spend 5 hours in school daily, how many hours will you spend in school during a year of 190 school days?



ORAL AND WRITTEN EXERCISES

1. James planted his garden on May 5th. In 65 days he began to sell radishes. On what date was that?

Make a calendar for May, June and July and count days to find the date. The teacher will show you how to make the calendar.

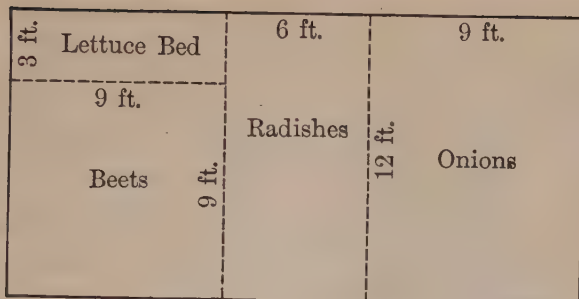
When you get older you will learn how to find such dates with much less trouble.

2. On June 12th he began selling lettuce. How many days did it take his lettuce to grow?
3. For 15 days he sold 2 bunches of radishes each day at 5 cents a bunch. How much did he get for his radishes?

His sales of his other crops were:

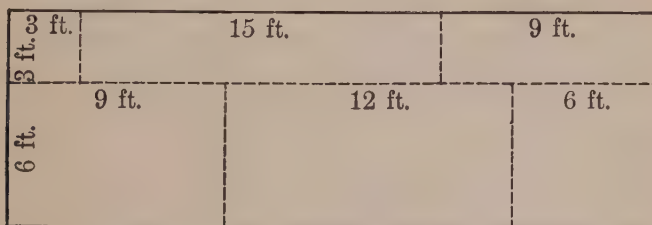
Crop	Number of days	Sale each day	Price per bunch
Lettuce.....	26	2 bunches	5 cents
Onions.....	16	4 bunches	3 cents
Beet Greens.....	14	2 bunches	2 cents
Beets.....	17	3 bunches	2 cents

4. How many bunches of lettuce did he sell? How much did he get for them?
5. How many bunches of each of the other crops did he sell? How much did he get for each of these crops?



ORAL AND WRITTEN EXERCISES

1. This is a drawing of James's garden. If his lettuce bed is 3 feet wide and 9 feet long, how many square feet are there in this bed?
2. How many yards long and how many yards wide is his lettuce bed? How many square yards are there in it?
3. How many square yards are there in his onion bed?
4. How many square yards are there in his radish bed?
5. How large is his beets bed?



6. This figure represents a garden with 6 different beds in it. What is its total length? Its total width?
7. How many square yards are there in the whole garden? How many square yards are there in each bed?



ORAL EXERCISES

1. How many things are there in one dozen?
2. What things can you think of that are sold by the dozen?
3. How many things are there in 2 dozen? In 3 dozen?
4. How many things are there in $\frac{1}{2}$ of a dozen? In $\frac{1}{3}$ of a dozen? In $\frac{2}{3}$ of a dozen? In $\frac{3}{4}$ of a dozen? In $\frac{1}{4}$ of a dozen? In $\frac{3}{4}$ of a dozen?
5. If eggs sell at 25 cents a dozen, how much will 6 dozen cost?
6. If oranges sell at 40 cents a dozen, how much will $\frac{1}{2}$ of a dozen cost? $1\frac{1}{2}$ dozen?
7. How many dozens are there in 24? In 36? In 48?
8. Six is what part of one dozen?
9. What is the cost of 6 oranges at 50 cents a dozen?
10. What is the cost of 6 lemons at 30 cents a dozen?
11. Which is more, $\frac{1}{2}$ of a dozen or $\frac{1}{3}$ of a dozen? How much?
12. Which is more, $\frac{1}{3}$ of a dozen or $\frac{1}{4}$ of a dozen? How much?
13. At 30 cents a dozen, how much will $\frac{1}{3}$ of a dozen cost?
14. At 40 cents a dozen, how much will $\frac{1}{4}$ of a dozen cost?
15. At 60 cents a dozen how much will $\frac{1}{2}$ of a dozen cost? $\frac{1}{4}$ of a dozen?

WRITTEN EXERCISES

See how long it takes you to copy and work all the examples in addition on this page. Ask the teacher to time you. Then see how long it takes you to work the examples in subtraction. Your work must be neat and accurate.

Add:

1. 547	2. 1767	3. 494	4. 289	5. 876
63	48	89	76	98
781	2930	676	458	986
94	87	85	694	375
276	2865	67	77	249
<u>89</u>	<u>58</u>	<u>384</u>	<u>579</u>	<u>99</u>
6. 5893	7. 9823	8. 7943	9. 351	10. 937
4387	786	679	69	468
36	7698	957	432	295
563	594	882	733	914
871	487	644	406	326
<u>406</u>	<u>673</u>	<u>197</u>	<u>296</u>	<u>341</u>

Subtract

1. 1432	2. 4321	3. 7843	4. 5932	5. 81900
<u>876</u>	<u>3745</u>	<u>5869</u>	<u>4159</u>	<u>24095</u>
6. 4826	7. 5479	8. 3678	9. 8612	10. 51704
<u>2789</u>	<u>587</u>	<u>799</u>	<u>3874</u>	<u>20908</u>
11. 4793	12. 5764	13. 4625	14. 3198	15. 14700
<u>2898</u>	<u>2889</u>	<u>786</u>	<u>2739</u>	<u>8937</u>
16. 2567	17. 4763	18. 4896	19. 4570	20. 25100
<u>679</u>	<u>2876</u>	<u>989</u>	<u>2694</u>	<u>14108</u>

WRITTEN EXERCISES

See how long it takes you to copy and multiply the first 12 examples on this page.

$$\begin{array}{r} 1. \ 480 \\ \underline{46} \end{array}$$

$$\begin{array}{r} 2. \ 365 \\ \underline{36} \end{array}$$

$$\begin{array}{r} 3. \ 473 \\ \underline{54} \end{array}$$

$$\begin{array}{r} 4. \ 504 \\ \underline{67} \end{array}$$

$$\begin{array}{r} 5. \ 896 \\ \underline{48} \end{array}$$

$$\begin{array}{r} 6. \ 706 \\ \underline{93} \end{array}$$

$$\begin{array}{r} 7. \ 890 \\ \underline{47} \end{array}$$

$$\begin{array}{r} 8. \ 978 \\ \underline{86} \end{array}$$

$$\begin{array}{r} 9. \ 378 \\ \underline{27} \end{array}$$

$$\begin{array}{r} 10. \ 492 \\ \underline{67} \end{array}$$

$$\begin{array}{r} 11. \ 308 \\ \underline{58} \end{array}$$

$$\begin{array}{r} 12. \ 587 \\ \underline{34} \end{array}$$

13. If there are 20 rooms in your school building and 36 desks in each room, how many children will the building seat? How do you find out?
14. How many children will a schoolhouse seat if it has 16 rooms and 48 desks in each room?
15. A rectangle is 16 inches long and 12 inches wide. How many square inches are there in it?
16. How many square feet are there in a garden 18 feet long and 15 feet wide?

See how long it takes you to copy and multiply the following examples:

$$\begin{array}{r} 17. \ 800 \\ \underline{86} \end{array}$$

$$\begin{array}{r} 18. \ 780 \\ \underline{97} \end{array}$$

$$\begin{array}{r} 19. \ 394 \\ \underline{47} \end{array}$$

$$\begin{array}{r} 20. \ 789 \\ \underline{180} \end{array}$$

$$\begin{array}{r} 21. \ 670 \\ \underline{50} \end{array}$$

$$\begin{array}{r} 22. \ 530 \\ \underline{187} \end{array}$$

$$\begin{array}{r} 23. \ 740 \\ \underline{206} \end{array}$$

$$\begin{array}{r} 24. \ 987 \\ \underline{98} \end{array}$$

$$\begin{array}{r} 25. \ 398 \\ \underline{84} \end{array}$$

$$\begin{array}{r} 26. \ 726 \\ \underline{309} \end{array}$$

$$\begin{array}{r} 27. \ 891 \\ \underline{84} \end{array}$$

$$\begin{array}{r} 28. \ 984 \\ \underline{203} \end{array}$$

ORAL EXERCISES

Give quotients and remainders in the following:

- | | | | | |
|-----------------------|--------------------|--------------------|--------------------|--------------------|
| 1. $6 \overline{)47}$ | 7 $\overline{)48}$ | 9 $\overline{)50}$ | 8 $\overline{)49}$ | 7 $\overline{)68}$ |
| 2. $5 \overline{)43}$ | 8 $\overline{)54}$ | 7 $\overline{)53}$ | 6 $\overline{)55}$ | 4 $\overline{)35}$ |
| 3. $6 \overline{)56}$ | 8 $\overline{)57}$ | 9 $\overline{)57}$ | 8 $\overline{)65}$ | 5 $\overline{)43}$ |
| 4. $7 \overline{)61}$ | 9 $\overline{)60}$ | 7 $\overline{)62}$ | 8 $\overline{)65}$ | 6 $\overline{)57}$ |
| 5. $9 \overline{)67}$ | 8 $\overline{)68}$ | 7 $\overline{)63}$ | 5 $\overline{)46}$ | 9 $\overline{)69}$ |
| 6. $7 \overline{)69}$ | 9 $\overline{)63}$ | 5 $\overline{)38}$ | 6 $\overline{)50}$ | 8 $\overline{)67}$ |
| 7. $9 \overline{)75}$ | 8 $\overline{)76}$ | 6 $\overline{)33}$ | 8 $\overline{)79}$ | 7 $\overline{)38}$ |
| 8. $7 \overline{)60}$ | 8 $\overline{)34}$ | 9 $\overline{)83}$ | 5 $\overline{)33}$ | 5 $\overline{)28}$ |

Ask your teacher if you may play a game like the one on page 71, using this kind of examples.

9. How many weeks and how many days over are there in 54 days?
10. If you go to school 38 days, how many weeks and days do you go to school? (Remember that you go to school only 5 days a week.)
11. If you know how many inches tall you are, how do you find out how many feet and inches this is?
12. How many inches tall are you? How many feet and inches is this?
13. How many feet long is your schoolhouse? How many yards and feet is this?
14. Make other problems of this kind and solve them.

Example 1. Divide 684 by 2.

342 (quotient)	
Divisor 2) 684 (dividend)	

2 is contained in 6, 3 times.

Write 3 directly above the 6.

2 is contained in 8, 4 times.

Write 4 directly above the 8.

2 is contained in 4, 2 times. Write 2 above the 4.

Test the quotient by multiplying it by the divisor. The product should be the dividend.

In division the number that is divided is called the **dividend**, and the number by which we divide is the **divisor**.

WRITTEN EXERCISES

Divide each of the following and test by multiplying:

1. $2 \overline{)864}$ $2 \overline{)684}$ $3 \overline{)369}$ $4 \overline{)484}$

2. $3 \overline{)693}$ $3 \overline{)699}$ $4 \overline{)448}$ $4 \overline{)888}$

Sometimes the first number of the dividend is so small that the divisor is not contained at all in it.

Example 2. Divide 1246 by 2.

623
2) 1246

In this case we first divide 12 by 2, getting 6. Then go on as before.

WRITTEN EXERCISES

Divide each of the following:

3. $2 \overline{)1868}$ $2 \overline{)1484}$ $3 \overline{)1536^7}$ $3 \overline{)1839^7}$

4. $4 \overline{)1684}$ $4 \overline{)1248}$ $3 \overline{)2436}$ $2 \overline{)18486}$

5. $6 \overline{)1866}$ $3 \overline{)2199}$ $4 \overline{)2448}$ $4 \overline{)16884}$

6. $5 \overline{)1055}$ $4 \overline{)1284}$ $3 \overline{)1269}$ $2 \overline{)1468}$

7. $3 \overline{)1569}$ $4 \overline{)2448}$ $4 \overline{)3284}$ $2 \overline{)1848}$

Example 1. Divide 476 by 2.

$$\begin{array}{r} 238 \\ 2 \overline{) 476} \end{array}$$

2 is contained in 4, 2 times. Write 2 directly above the 4. 2 is contained in 7 3 times with a remainder of 1. Write 3 directly above the 7. The remainder 1 placed to the left of the 6 makes 16. 2 is contained in 16 8 times.

Test:

$$\begin{array}{r} 238 \\ \times 2 \\ \hline 476 \end{array}$$

To test, multiply the quotient by the divisor. The result should be the dividend.

Hundreds: 2 in 4, 2 times. Write 2.

Tens: 2 in 7, 3 times, remainder 1. Write 3.

Ones: 2 in 16, 8 times. Write 8.

} Short
explanation

Example 2. Divide 785 by 5.

$$\begin{array}{r} 157 \\ 5 \overline{) 785} \end{array}$$

Hundreds: 5 in 7, 1 time, remainder 2. Write 1.
Tens: 5 in 28, 5 times, remainder 3. Write 5.
Ones: 5 in 35, 7 times. Write 7.

Test:

$$\begin{array}{r} 157 \\ \times 5 \\ \hline 785 \end{array}$$

To test, multiply 157 (the quotient) by 5 (the divisor). The result is 785 (the dividend).

WRITTEN EXERCISES

In this way divide each of the following:

- | | | | | |
|-------------------------|----------------------|----------------------|----------------------|----------------------|
| 1. $2 \overline{) 576}$ | $2 \overline{) 836}$ | $3 \overline{) 891}$ | $3 \overline{) 549}$ | $3 \overline{) 246}$ |
| 2. $4 \overline{) 896}$ | $4 \overline{) 768}$ | $4 \overline{) 656}$ | $4 \overline{) 796}$ | $4 \overline{) 896}$ |
| 3. $5 \overline{) 895}$ | $5 \overline{) 985}$ | $5 \overline{) 475}$ | $5 \overline{) 935}$ | $5 \overline{) 695}$ |
| 4. $6 \overline{) 786}$ | $6 \overline{) 846}$ | $6 \overline{) 960}$ | $6 \overline{) 852}$ | $6 \overline{) 744}$ |

5. How many weeks are there in 609 days?

6. How many yards are there in 549 feet? In 756 feet?

Ask your teacher if you may play the game like the one on page 91, using such examples as these.

People learn to add, subtract, multiply and divide because they need to do these things in solving problems. The hardest part of arithmetic is to decide *when* to add, when to subtract, when to multiply, and when to divide.

First of all we must remember that the *sum* of numbers is found by adding them, the *difference* between numbers is found by subtracting, the *product* is found by multiplying, and the *quotient* is found by dividing. After you have made sure that you understand this, study the problems below with care.

ORAL AND WRITTEN EXERCISES

1. If you know how many children there are in your room and also in another room, how do you find how many children there are in both rooms? *Answer:* By adding the two numbers. Why?

Make problems of this kind and solve them.

2. If you know how much money you had when you went into a store, and also how much you had when you came out of it, how can you tell how much money you spent in that store? *Answer:* By subtracting what I had when I came out from what I had when I went in. Why?

Make problems of this kind and solve them.

3. If you know how much one chair costs, and also how many your mother bought, how can you tell how much she paid for them? *Answer:* By multiplying the cost of one chair by the number of chairs. Why?

Make problems of this kind and solve them.

4. If you know two numbers how can you tell how much larger one is than the other? *Answer.* By subtracting the smaller number from the larger. Why?

Make problems of this kind and solve them.

ORAL EXERCISES

1. If you know how many boys there are in a class and also how many girls, how can you tell how many there are all together in the class?
2. If you know how many children there are in a class and also how many boys there are, how can you tell how many girls there are in the class?
3. If you know how many children there are in each room of your school, how can you tell how many children there are in the school?
4. If you know how many children there are in your school, and also how many passed in number work, how can you tell how many failed in number work?
5. If you know how many desks were bought for your school and also how much each desk cost, how can you tell how much all the desks cost?
6. If you know two numbers, how do you find how much greater one is than the other?
7. If you know two numbers, how do you find the difference between them?
8. If you know the price of the arithmetics used in your class, and also the number of arithmetics needed, how can you tell how much these books cost?
9. If you know how many pages there are in a book, and also how many pages of it you have read, how can you tell how many pages you still have to read?
10. How do you find the sum of two numbers? Their difference? Their product?
11. Ask other questions like these, and answer them.

ORAL EXERCISES

1. Did you ever send a letter by mail? How much does it cost to send a letter by mail?
2. How much does a postal card cost?



3. Jane sent out 12 letters of invitation to a birthday party. How much did she pay for stamps?
4. While Jane was in the country for a visit, she sent 7 letters and 9 postal cards to her friends. How much did she spend for postage?
5. Jane's father keeps a store and sends out many letters each week. One day he bought 2-cent stamps for a dollar. How many did he get?
6. One day Jane's father walked up to the stamp window in the post-office and handing in a one-dollar bill said, "Give me 40 2-cent stamps and the rest in 1-cent stamps." How many 1-cent stamps did he get?
7. Did you ever see anyone get a letter by special delivery? How much extra does it cost to get a letter delivered this way?
8. How many special-delivery stamps can you buy for one dollar?
9. It costs 5 cents to send a letter to some foreign countries. How many 5-cent stamps can you buy for one dollar?
10. A sheet of stamps contains 100 stamps. What is the cost of a sheet of 2-cent stamps?
11. Make other problems on postage, and solve them.

1. William's baseball suit cost \$7.50, cap \$0.45, and belt \$0.35. What was the total cost of his outfit?
2. What will be the total cost of 12 baseball outfits at \$8.25 each?
3. A baseball team paid \$3.75 for a mask, \$5.50 for a body protector, \$2.50 for a catcher's glove, \$3.00 for balls, and \$2.50 for bats. How much did all these articles cost?
4. William's baseball "nine" played 12 games and lost $\frac{1}{3}$ of them. How many games did they lose? How many did they win?
5. Tom's baseball "nine" played 15 games and won $\frac{2}{3}$ of them. How many games did they win? How many did they lose?
6. In a contest Harry batted a ball 215 feet, and John 183 feet. How much farther did Harry bat the ball than John?
7. The distance around a baseball "diamond" is 360 feet. What is the distance from any of the four bases to the next one, if these four distances are all equal?
8. On a regular baseball field the left-field fence is 380 feet from the home plate, and the right-field fence only 294 feet. How much farther must a batter hit a ball to go over the left- than over the right-field fence?
9. Tom received \$3.25 a week for working in a store during vacation. How much did he earn in 7 weeks?
10. Tom saved \$1.75 each week he worked. How much did he save in 7 weeks?

1. In going camping some girls rode 108 miles on the train, 11 miles on trolley and 14 miles in an automobile. How far did they ride altogether?
2. Each girl paid \$2.16 railroad fare, \$0.10 on the trolley, and \$0.50 to ride in the automobile. How much fare did each girl pay altogether?
3. The total expense for each girl on this camping trip was \$9.25. What did it cost 6 girls to make the trip?
4. Mary's mother bought her a camping suit for \$12.35, a hat for \$0.98 and a pair of shoes for \$2.25. What was the total cost of Mary's outfit?
5. Jane helped Mrs. Smith mornings during vacation and saved \$1.25 each week out of the money earned. How much did she save in 9 weeks?
6. Mary helped her mother by gathering eggs. One week she gathered 17 eggs on Sunday, 16 on Monday, 20 on Tuesday, 18 on Wednesday, 19 on Thursday, 20 on Friday, and 19 on Saturday. How many eggs did she gather this week?
7. One week Mary gathered 165 eggs. The family used 43 of these eggs, and the rest were put down. How many eggs were put down? How do you find out?
8. Nora went shopping and spent \$1.35 in one store, \$2.35 in a second, \$2.65 in a third, and \$0.85 in a fourth. How much did her purchases amount to altogether?
9. Elizabeth sold 16 Chautauqua tickets for \$2.25 each. How much did she receive for the 16 tickets?
10. Elizabeth was paid $\frac{1}{6}$ of the \$36 she received for the tickets. How much did she earn selling tickets?

If you have done this year's work in arithmetic well, you will be able to answer these questions rapidly and accurately.

- | | | |
|---------------|-----------------|--------------------------|
| 1. Add: 14894 | Subtract: 90742 | Explain these processes. |
| 39877 | 49378 | |
| 54771 | 41364 | |

Supply the missing numbers in the following and give all number facts related to each one.

- | | | | | |
|---------------------|------------------|------------------|------------------|------------------|
| 2. $4 \times 8 = ?$ | $7 \times 6 = ?$ | $9 \times 5 = ?$ | $6 \times 9 = ?$ | $8 \times 3 = ?$ |
| 3. $5 \times 8 = ?$ | $7 \times 8 = ?$ | $9 \times 7 = ?$ | $9 \times 9 = ?$ | $8 \times 9 = ?$ |
| 4. $6 \times 6 = ?$ | $8 \times 6 = ?$ | $7 \times 7 = ?$ | $4 \times 9 = ?$ | $8 \times 7 = ?$ |

Give quotients and remainders in the following:

- | | | | | | |
|-----------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| 5. $8 \overline{)46}$ | $7 \overline{)58}$ | $6 \overline{)39}$ | $8 \overline{)68}$ | $9 \overline{)43}$ | $7 \overline{)61}$ |
| 6. $5 \overline{)32}$ | $9 \overline{)76}$ | $8 \overline{)59}$ | $7 \overline{)47}$ | $6 \overline{)49}$ | $9 \overline{)34}$ |
| 7. $7 \overline{)58}$ | $6 \overline{)38}$ | $5 \overline{)47}$ | $8 \overline{)43}$ | $8 \overline{)37}$ | $8 \overline{)59}$ |
| 8. $3 \overline{)20}$ | $3 \overline{)26}$ | $3 \overline{)28}$ | $3 \overline{)19}$ | $4 \overline{)27}$ | $6 \overline{)47}$ |
| 9. $8 \overline{)52}$ | $8 \overline{)69}$ | $8 \overline{)74}$ | $8 \overline{)41}$ | $8 \overline{)38}$ | $8 \overline{)29}$ |

Supply the missing numbers:

- | | |
|-----------------------|-----------------------|
| 10. 1 lb. = ? oz. | 1 week = ? days |
| 1 pk. = ? qt. | 1 year = ? months |
| 1 bu. = ? pk. | 1 year = ? days |
| 1 bu. = ? qt. | 1 nickel = ? cents |
| 1 gal. = ? qt. | 1 dime = ? cents |
| 1 qt. = ? pt. | 1 quarter = ? cents |
| 1 day = ? hours | 1 dollar = ? cents |
| 1 ft. = ? in. | 1 quarter = ? nickels |
| 1 yd. = ? in. | 1 dollar = ? dimes |
| 1 yd. = ? ft. | 1 dollar = ? nickels |
| 1 sq. yd. = ? sq. ft. | 1 dollar = ? quarters |

You should now be able to copy and solve the following rapidly and accurately:

Add:

I

1. 467	2. 576	3. 687	4. 784
836	487	468	675
593	635	597	486
748	796	768	519
<u>675</u>	<u>568</u>	<u>492</u>	<u>673</u>

Subtract:

5. 4679	6. 5798	7. 6700	8. 7305
<u>3789</u>	<u>3899</u>	<u>4998</u>	<u>6089</u>

Multiply:

9. 430	10. 762	11. 575	12. 290
<u>526</u>	<u>630</u>	<u>837</u>	<u>967</u>

Add:

II

1. 6324	2. 8632	3. 9026	4. 4068
1978	5916	5784	4507
3867	7985	9843	4984
7698	4896	7987	3763
<u>9678</u>	<u>9874</u>	<u>8796</u>	<u>4327</u>

Subtract:

5. 39082	6. 1937	7. 45103	8. 15501
<u>21874</u>	<u>862</u>	<u>12792</u>	<u>3272</u>

Multiply:

9. 204	10. 142	11. 246	12. 798
<u>720</u>	<u>143</u>	<u>123</u>	<u>284</u>

CHAPTER IV

READING NUMBERS

ORAL EXERCISES

1. Count to 1000 by hundreds. How many hundreds are there in 1000?
2. The number 10,000 is read *ten thousand*. Count to 10,000 by thousands.
3. The number 100,000 is read *one hundred thousand*. Count to 100,000 by ten thousands.

If a number has more than four figures it is usual to separate them into groups of three in each, beginning from the right. These groups are called *periods*. The first period to the right represents *ones*, the second *thousands*, the third *millions*. Thus in the number 4,659,321, the period to the right represents 321 *ones*, the next period represents 659 *thousands*, and the next period represents 4 *millions*.

WRITTEN EXERCISES

Copy and separate into periods the following numbers, which the United States Census of 1910 gave as the populations of the States and cities named:

States		Cities	
New York	9113614	New York	4766883
Pennsylvania	7665111	Chicago	2165233
Illinois	5638581	Philadelphia	1542008
Ohio	4767121	St. Louis	687029
Texas	3896542	Boston	670585

The number 2,790,408 is read *two million, seven hundred ninety thousand, four hundred eight*.

ORAL EXERCISES

Read each of the following numbers:

2760	47,082	157,483	1,435,678
3436	50,793	238,936	3,502,891

WRITTEN EXERCISES

Write the following numbers in figures:

1. One hundred twelve thousand, five hundred eleven.
2. Two hundred thirty-seven thousand, six hundred twenty.
3. Forty-eight thousand, two hundred ten.
4. Six million, ninety-five thousand, six hundred eighty-four.
5. Seven hundred three thousand, thirty-four.
6. Five million, eight hundred thousand, six hundred twenty-three.
7. Three million, two hundred thirty thousand, seven hundred forty-five.
8. Eight million, fifteen thousand, one hundred sixty-seven.
9. Nine million, four thousand, six hundred ninety-five.
10. Six million, three hundred forty thousand, four hundred twenty-nine.
11. Seven million, nine hundred eighty-six thousand, four hundred twenty-nine.
12. Collect some large automobile numbers and house numbers, or other large numbers, and read them. See which member of the class can find the largest ones.

The figures 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 are called *Arabic* figures or Arabic numerals because the Arabs introduced them into Europe.

The *Romans* wrote all their numbers by means of combinations of the following letters, whose values are given directly below the letters:

Letters:	I	V	X	L	C	D	M
Values:	1	5	10	50	100	500	1000

You have learned from the face of the clock the first twelve Roman numerals, which are:

I II III IV (or IIII) V VI VII VIII IX X XI XII

In the Roman notations these letters are combined according to the following rules:

When a letter of less value stands to the left of another letter then its value is subtracted.

In all other cases the numbers are added.

Thus in IV and in XIX the number I is subtracted, while in VI and in XXI it is added. That is, $IV = 5 - 1 = 4$, $XIX = 10 - 1 + 10 = 19$, $VI = 5 + 1 = 6$, $XXI = 10 + 10 + 1 = 21$.

ORAL EXERCISES

Read the following numbers:

XIII	XXVI	LXVII	CC	CD
XV	XXXIV	LXXX	MDC	CM
XVIII	XLI	LXXIX	DC	MC
XX	LII	XC	DCC	MCC

WRITTEN EXERCISES

Write the following numbers in the Roman notation:
15, 20, 30, 50, 60, 90, 100, 120, 190, 350, 550.

See how long it takes you to add the first twenty examples below and write the sums. How long does it take you to add the last twenty and write the sums? Add each column both downward and upward. Do not copy the numbers. Place a paper directly below the columns and write the sums on it.

In adding the first column downward, say 5, 8, 10, 12, 17. Do not say $5+3=8$, $8+2=10$, and so on.

[illegible]

Example. Add the numbers 38,764, 21,926, 70,437, 8246, and 285.

First write the numbers in a column as shown below.

In copying the numbers, be careful to place all the *ones* in the first column, all the *tens* in the second column, and so on.

EXPLANATIONS

38764	<i>Ones:</i> 4, 10, 17, 23, 28. Write 8, carry 2.
21926	<i>Tens:</i> 2, 8, 10, 13, 17, 25. Write 5, carry 2.
70437	<i>Hundreds:</i> 2, 9, 18, 22, 24, 26. Write 6, carry 2.
8246	<i>Thousands:</i> 2, 10, 11, 19. Write 9, carry 1.
285	<i>Hundred thousands:</i> 1, 4, 6, 13. Write 13.
139658	
1 2 2 2	

Frequently the numbers to be carried are written in small pencil figures below the numbers in the sum, as shown here.

Test the result by adding each column upward as well as downward. Read the sum.

WRITTEN EXERCISES

Write the numbers below in columns and add them. Test by adding each column both downward and upward. Read each sum. Explain fully the first two examples.

1. 2819, 79586, 587, 68597, 4251, 847693, 324781.
2. 840, 6890, 2806, 10846, 4176, 294624.
3. 5081, 419, 7629, 38672, 84871, 7617, 93408.
4. 3412, 799, 471, 93840, 9130, 4578, 19370.
5. 8510, 297, 1704, 304839, 20139, 84323, 30917.
6. 1805, 1942, 2976, 17488, 1777, 3408.
7. 2170, 3471, 95400, 32742, 54321, 5243, 92642.

Drill in Fundamentals. Play a game like the one on page 91, using examples in addition.



This girl receives the cash paid in by customers of the store. She writes in columns the amounts she receives. At the end of the day she adds these amounts to see how much has been received during the day. Then she counts the money to see whether she has made change correctly. She adds each column separately, and then adds the sum.

WRITTEN EXERCISES

Find the sum of each column, then add the sums:

\$1.76	\$0.41	\$7.12	\$0.83
4.91	.92	12.84	.49
4.62	.38	9.36	7.89
.84	.46	.41	6.48
.35	3.61	.04	.10
.18	4.91	2.18	.94
<u>6.07</u>	<u>7.38</u>	<u>.34</u>	<u>.07</u>
.41	5.93	.46	.38
10.83	8.64	.71	2.40
1.12	1.91	2.18	.32
16.94	3.17	8.73	.08
5.75	10.40	5.30	2.10
8.70	2.60	6.70	1.70
<u>1.60</u>	<u>2.70</u>	<u>1.90</u>	<u>3.60</u>

In all larger stores the cash received is now added on the cash register. But in the home, on the farm, in many small stores, shops, and other businesses, items of cash are added as shown on this page.

Marshall, Field & Co.,
Chicago, Ill.

Purchases for month ending Dec. 31, 1918.

Mr. James B. Noble,
5835 Prairie Ave.

Dec.	8		Charges		Total	
		One suit.....	\$27	50		
		6 shirts at \$1.50.....	9	00		
		1 dozen collars.....	1	75		
		3 ties at 75¢.....	2	25		
		Total.....			\$40	50

Copy this bill and add to find the total amount. Marshall, Field & Co. are the sellers, and James B. Noble is the buyer.

WRITTEN EXERCISES

Make out a bill from each of the following. Use your own name as that of the buyer and the name of some store that you know as the seller.

1 tablecloth.....	\$3.75
1 dozen napkins.....	2.50
6 bath towels.....	1.90
6 muslin sheets at 55¢ apiece.	3.30
8 pillow-cases at 17¢ apiece..	1.36
Total.....	

1 brass bed.....	\$11.75
6 chairs at \$2.75 apiece.....	16.50
1 mattress.....	12.95
1 swing chair.....	1.25
1 parlor chair.....	7.50
Total.....	



WRITTEN EXERCISES

1. By way of the Pennsylvania Railroad the distance from New York to Philadelphia is 90 miles, Philadelphia to Pittsburgh 354 miles, Pittsburgh to Fort Wayne 320 miles, Fort Wayne to Chicago 148 miles. How many miles is it from New York to Chicago?
2. On the New York Central the distance from New York to Albany is 143 miles, from Albany to Buffalo 297 miles, Buffalo to Cleveland 183 miles, Cleveland to Chicago 357 miles. How many miles is it from New York to Chicago by way of the New York Central?
3. The distance from Boston to Chicago is 1037 miles, Chicago to St. Paul 412 miles, St. Paul to Seattle 1913 miles. What is the distance from Boston to Seattle?
4. From Chicago to Omaha is 492 miles, Omaha to Salt Lake City 1037 miles, Salt Lake City to San Francisco 749 miles. Find the total distance.

WRITTEN EXERCISES

1. A school of 8 rooms has the following enrollment for the various rooms: 41, 36, 38, 43, 35, 43, 44 and 45 pupils. How many pupils are enrolled in the school?
2. One day the attendance in these rooms was 40, 36, 36, 41, 34, 42, 41 and 43. What was the total attendance this day?
3. In a large grade-school building there are 217 children in the first grade, 194 in the second grade, 180 in the third grade, 165 in the fourth grade, 152 in the fifth grade, 150 in the sixth grade, 104 in the seventh grade, and 89 in the eighth grade. How many children are there in the whole building?
4. In a certain city there are thirteen school buildings. The numbers of pupils in these buildings are: 397, 264, 542, 631, 606, 428, 467, 792, 420, 685, 361, 298 and 427. How many pupils are there in the schools of this city?
5. The numbers of teachers in these buildings are: 13, 10, 17, 22, 16, 13, 15, 25, 14, 22, 11, 9 and 14. How many teachers are there in these schools?
6. In finding the number of children of school age in a large city, the number in each district is counted. Then how may the total number be found? Explain why it would be difficult to count all the children in the city directly without adding.
7. How do you think the number of children in the schools of a large city is found? Try to find the number of children in some large schools. Then find the number of children in all of them.

Example. From 3904 subtract 1247.

First Method:

3904 (minuend)	<i>Ones:</i> $14 = 7 + 7$. Write 7, carry 1.
<u>1247</u> (subtrahend)	<i>Tens:</i> $10 = 5 + 5$. Write 5, carry 1.
2657 (remainder)	<i>Hundreds:</i> $9 = 3 + 6$. Write 6.
	<i>Thousands:</i> $3 = 1 + 2$. Write 2.

In practice we simply say:

$14 = 7 + 7$; $10 = 5 + 5$; $9 = 3 + 6$; $3 = 1 + 2$.

Second Method:

We cannot take 7 from 4, so we take 1 hundred from 9 hundreds and think of it as $90 + 10$. The 10 is added to the 4, making 14, and the 90 is put in ten's place. Then 7 from 14 leaves 7, 4 tens from 9 tens leaves 5 tens, 2 hundreds from 8 hundreds leaves 6 hundreds, 1 thousand from 2 thousands leaves 1 thousand.

In practice we say: $14 - 7 = 7$, $9 - 4 = 5$, $8 - 2 = 6$, $3 - 1 = 2$.

WRITTEN EXERCISES

Subtract each of the following:

- | | | | |
|---|---|--|---|
| 1. $\begin{array}{r} 4094 \\ 1427 \\ \hline \end{array}$ | 2. $\begin{array}{r} 1794 \\ 379 \\ \hline \end{array}$ | 3. $\begin{array}{r} 5004 \\ 897 \\ \hline \end{array}$ | 4. $\begin{array}{r} 2743 \\ 850 \\ \hline \end{array}$ |
| 5. $\begin{array}{r} 8107 \\ 489 \\ \hline \end{array}$ | 6. $\begin{array}{r} 1109 \\ 478 \\ \hline \end{array}$ | 7. $\begin{array}{r} 5407 \\ 2806 \\ \hline \end{array}$ | 8. $\begin{array}{r} 8109 \\ 3824 \\ \hline \end{array}$ |
| 9. $\begin{array}{r} 14004 \\ 8647 \\ \hline \end{array}$ | 10. $\begin{array}{r} 21094 \\ 7808 \\ \hline \end{array}$ | 11. $\begin{array}{r} 85000 \\ 6478 \\ \hline \end{array}$ | 12. $\begin{array}{r} 60000 \\ 45782 \\ \hline \end{array}$ |
| 13. $\begin{array}{r} 5061 \\ 3708 \\ \hline \end{array}$ | 14. $\begin{array}{r} 8160 \\ 2497 \\ \hline \end{array}$ | 15. $\begin{array}{r} 6470 \\ 2972 \\ \hline \end{array}$ | 16. $\begin{array}{r} 28754 \\ 16907 \\ \hline \end{array}$ |
| 17. $\begin{array}{r} 23420 \\ 16090 \\ \hline \end{array}$ | 18. $\begin{array}{r} 79420 \\ 16800 \\ \hline \end{array}$ | 19. $\begin{array}{r} 22720 \\ 9847 \\ \hline \end{array}$ | 20. $\begin{array}{r} 78900 \\ 24763 \\ \hline \end{array}$ |

WRITTEN EXERCISES

1. The highest mountain in the world is 29,002 feet high. The highest mountain in the United States is 20,464 feet high. What is the difference between these heights?

During four recent years the losses from fire in the United States and the insurance on these losses were as follows:

Fire Losses	Insurance
\$214,003,300	\$150,246,000
217,004,575	161,200,000
225,320,000	176,359,200
229,000,000	180,000,000

2. Find the difference between the losses and insurance for each year separately and also for the four years.

Stores have prices marked on the articles they sell. Sometimes the goods are sold below the marking price. The amount by which the price is lowered is called *discount*.

3. A lady bought the following pieces of furniture:

	Marked Price	Discount
1 table.....	\$46.50	\$4.65
1 bed.....	54.00	5.40
1 dozen chairs.....	72.00	7.20
1 rug.....	45.00	4.50
1 sideboard.....	84.00	8.40

Tell the marking price of each article and the discount. What was the selling price of each article?

4. How much did the lady save all together by getting these discounts?
5. Find advertisements of sales in your paper and make problems like the above.

Read pages 147, 151 and 161 again, and supply the missing numbers. You should be able to read these pages rapidly. Make a list of those combinations that you cannot give at once and then practice on them.

ORAL EXERCISES

Read the following and supply the missing numbers:

- | | | | |
|---------------------|-------------------|-------------------|-------------------|
| 1. $8 \times 6 = ?$ | $7 \times ? = 56$ | $9 \times ? = 63$ | $5 \times ? = 45$ |
| $? \times 9 = 36$ | $? \times 7 = 49$ | $? \times 8 = 48$ | $? \times 7 = 56$ |
| $9 \times 9 = ?$ | $8 \times 8 = ?$ | $7 \times 7 = ?$ | $6 \times 6 = ?$ |
| $7 \times ? = 35$ | $8 \times ? = 32$ | $9 \times ? = 45$ | $6 \times ? = 54$ |
| $5 \times ? = 30$ | $6 \times ? = 36$ | $7 \times ? = 49$ | $8 \times ? = 64$ |
| $9 \times ? = 72$ | $8 \times ? = 56$ | $7 \times ? = 63$ | $9 \times ? = 54$ |
| $? \times ? = 81$ | $? \times ? = 49$ | $? \times ? = 64$ | $? \times ? = 36$ |
| $8 \times ? = 72$ | $9 \times ? = 81$ | $9 \times ? = 63$ | $7 \times ? = 56$ |

ORAL AND WRITTEN EXERCISES

Answer as many as you can of the following without using pencil and paper:

- Multiply each of the numbers 3, 6, 7, 8, 4, 5, by 10.
Notice that to multiply a number by 10 we annex one zero to the right.
To multiply a number by 20, multiply it by 2 and then by 10, that is, multiply it by 2 and annex one zero.
- Multiply each of the following by 20: 18, 21, 46, 34, 52, 61, 73, 68, 57.
- How may a number be multiplied by 30? By 40? By 50? By 60? By 70? By 80? By 90?
- Find the products of the following: 60×38 , 70×48 , 80×59 , 90×27 , 50×89 , 60×86 , 70×65 , 80×93 , 90×68 .

A FIELD MEET

The teacher has selected 4 captains, who have chosen their teams. The teacher reads number combinations, such as $? \times 8 = 56$. The pupils write these and supply the missing numbers.

After the children have finished writing they exchange papers and mark the answers that are wrong or missing as the teacher reads the correct results. Then they count the number of correct answers and write this number on the paper. No child marks a paper belonging to a child on his own team. The papers are returned to the owners, and each child looks over his own paper to make sure it has been marked correctly. As each child reads his score the others write it in the column of his team. The scores are added, and the team that gets the highest score wins. If a child makes a mistake in marking a paper or in adding the score, one point is deducted from the score of his team for each mistake.

The children play they are having a field meet. The game just played is the first event. The next day they play the same game with combinations like $\frac{1}{4}$ of $42 = ?$ This is the second event. The third day they play the same game with combinations like $54 \div 6 = ?$ This is the third event.

The same teams play in all the events. The scores for all events are added, and the team that gets the highest total score wins.



1. The Royal Hand Laundry.

Look over this laundry bill with care to see whether it is made out correctly or not.

Name Norman Parker.

Pcs			Amt.
5	collars.....	2¢	10
2	shirts with cuffs....	12¢	24
2	undershirts.....	8¢	16
2	drawers.....	8¢	16
4	handkerchiefs.....	1¢	4
3	socks, per pair.....	4¢	12
Total.....			

If you pay this bill with a dollar what is your change?

Make out the following laundry bills, putting the name of your laundry and your own name on each:

2.	3	aprons.....	8¢	...	3.	3	boys' waists..	12¢	...
	4	tablecloths.	8¢	...		1	dress.....	50¢	...
	10	napkins....	2¢	...		2	wrappers.....	20¢	...
	16	towels.....	2¢	...		1	spread.....	15¢	...
	8	sheets.....	5¢	...		2	ladies' waists..	25¢	...
	8	pillow-cases	4¢	...		4	towels.....	2¢	...
Total.....					Total.....				

4.	6	collars	2¢	...	5.	14	handkerchiefs.	2¢	...
	2	cuffs, per pair	4¢	...		5	stockings, pair	5¢	...
	3	shirts	12¢	...		2	wrappers.	20¢	...
	2	night-shirts..	10¢	...		8	underwear.....	8¢	...
	6	socks, per pair	4¢	...		4	collars	4¢	...
	3	union suits... 15¢	...	...		1	waist	25¢	...
Total.....					Total.....				

If you pay each of these bills with two dollars, what is your change in each case?

Example 1. Multiply 846 by 234.

$$\begin{array}{r}
 846 \\
 \underline{234} \\
 3384 \\
 2538 \\
 \hline
 1692 \\
 197964
 \end{array}$$

Multiply by 4 ones; $4 \times 846 = 3384$.
 Multiply by 3 (tens), placing the first figure in tens' column; $3 \text{ (tens)} \times 846 = 2538 \text{ (tens)}$.
 Multiply by 2 (hundreds), placing the first figure in hundreds' column; $2 \text{ (hundreds)} \times 846 = 1692 \text{ (hundreds)}$.

Example 2. Multiply 3182 by 804.

$$\begin{array}{r}
 3182 \\
 \underline{804} \\
 12728 \\
 25456 \\
 \hline
 2558328
 \end{array}$$

First multiply by 4; then by 8 (hundreds).
 Place the first figure of the second product in hundreds' column.

WRITTEN EXERCISES

Multiply each of the following:

- | | | | |
|---|---|---|---|
| 1. $\begin{array}{r} 784 \\ \underline{327} \end{array}$ | 2. $\begin{array}{r} 896 \\ \underline{473} \end{array}$ | 3. $\begin{array}{r} 674 \\ \underline{584} \end{array}$ | 4. $\begin{array}{r} 895 \\ \underline{697} \end{array}$ |
| 5. $\begin{array}{r} 975 \\ \underline{789} \end{array}$ | 6. $\begin{array}{r} 876 \\ \underline{895} \end{array}$ | 7. $\begin{array}{r} 896 \\ \underline{987} \end{array}$ | 8. $\begin{array}{r} 659 \\ \underline{498} \end{array}$ |
| 9. $\begin{array}{r} 904 \\ \underline{307} \end{array}$ | 10. $\begin{array}{r} 784 \\ \underline{806} \end{array}$ | 11. $\begin{array}{r} 293 \\ \underline{407} \end{array}$ | 12. $\begin{array}{r} 809 \\ \underline{507} \end{array}$ |
| 13. $\begin{array}{r} 807 \\ \underline{609} \end{array}$ | 14. $\begin{array}{r} 804 \\ \underline{703} \end{array}$ | 15. $\begin{array}{r} 907 \\ \underline{605} \end{array}$ | 16. $\begin{array}{r} 306 \\ \underline{409} \end{array}$ |
| 17. $\begin{array}{r} 408 \\ \underline{723} \end{array}$ | 18. $\begin{array}{r} 809 \\ \underline{847} \end{array}$ | 19. $\begin{array}{r} 406 \\ \underline{804} \end{array}$ | 20. $\begin{array}{r} 508 \\ \underline{603} \end{array}$ |

Drill in Fundamentals. Play the game on page 91, using examples in multiplication.



These children are playing dry-goods store. Two children are clerks. They make out sales checks like the one on the next page.

ORAL AND WRITTEN EXERCISES

1. How does the clerk find out how much the 8 yards of silk cost? Find this cost.
2. How does he find out how much the 12 yards of serge cost? Find this cost.
3. How does he find out how much the 18 yards of sheeting cost? Are the amounts given in the bill on the next page correct?
4. How much does the whole bill amount to?
5. What change should be given from a \$20.00 bill?
6. At the prices given above find the cost of 26 yards of silk and 54 yards of sheeting. How much do both cost?
7. At the above prices find the total cost of 14 yards of silk, 18 yards of serge and 36 yards of sheeting.

John Wanamaker
General Merchandise
New York, N. Y.

March 9, 1915

8	yards of silk at 85¢	\$6.80
12	yards of serge at 76¢	9.12
18	yards of sheeting 19¢	3.42
	Amount received, \$20.00	<u>\$19.34</u>

WRITTEN EXERCISES

Make out sales checks for the following sales and put in the name of some store as the seller. First find how much each sale amounts to, then find how much change is given in each case.

1. 6 pairs of socks at 25¢ a pair.....
3 shirts at \$1.25.....
1 dozen collars..... \$1.30
Amount received, \$10.00.....
2. 1 boy's suit..... \$2.25
1 boy's sweater..... 1.80
1 boy's hat..... 2.25
3 ties at 35¢.....
Amount received, \$10.00.....
3. 1 toy bank..... \$0.50
2 children's books at 35¢.....
3 games at 63¢.....
1 toy engine 1.75
Amount received, \$5.00.....
4. 6 sheets at 85¢.....
8 pillow-cases at 25¢.....
1 dozen towels at 35¢ apiece.....
Amount received, \$15.00.....

ORAL AND WRITTEN EXERCISES

1. Name the months of the year. See page 166.
 2. How many days are there in each month? In the first six months?
 3. How many days are there in an ordinary year? In a leap-year?
 4. How many years old were you on your last birthday? How many days old were you, counting 365 days to the year?
 5. How many years ago were you born? Find out for yourself what year that was.
 6. How many days old will you be on your next birthday?
 7. How many years old was your father on his last birthday? How many days old was he then, counting 365 days to the year?
 8. How many days do you go to school each week? How many weeks of school do you have each year? How many school days is that?
- There are 365 days in one year
There are 52 weeks in one year
9. A man goes to his business 280 days in one year. How much car-fare does he pay in one year going to and from his business, if he pays a nickel each way?
 10. Write five interesting facts about the calendar. Read them aloud to see which child has found the most interesting ones.
 11. What months have 31 days? What months have 30 days? What month has 28 days?

ORAL AND WRITTEN EXERCISES

(Use pencil and paper only when necessary)

1. If you save one cent each day, how much will you save in one year?
2. Harry puts two cents into his bank every school day. How much does he save in one week? In 6 weeks?
3. James puts a dime into his bank every week. How much will he have at the end of his school year (38 weeks)?
4. Herbert's father puts \$25 into the bank each year for his son. How much will he put in for him in 21 years?
5. During the 10 weeks before Christmas, Mary saved 2 cents every day. How much did she save? What Christmas presents could she buy with this money?
6. Some children live about a mile from school. How much does each child save in a week by walking instead of riding if the fare is 5 cents each way?
7. Alice puts 3 cents into the school savings bank each school day. How much does she save in one week? In 7 weeks?
8. Steven puts 2 cents into the Penny Provident Savings Bank every day of the week except Sunday. How much does he save in one week? In 10 weeks? In a school year of 38 weeks?
9. Make problems about putting a certain amount of money in the school savings bank each day.

Drill in Fundamentals. Play a game like that on page 195, using examples in addition for the first event, examples in subtraction for the second event, and examples in multiplication for the third. Run off one event each day.

Apples, 3 for 5¢	Lemons, 30¢ a dozen
Oranges, 3 for 10¢	Peaches, 40¢ a basket
Bananas, 2¢ apiece	Grapes, 18¢ for a small basket
Grapefruits, 15¢ apiece	30¢ for a large basket

WRITTEN EXERCISES

At the above prices, what would be the cost of each of the following purchases? Make out sales check like those on page 199 for each purchase. Find the cost of each article without using pencil and paper.

1. 6 apples
3 oranges
1 small basket of grapes
2. $\frac{1}{2}$ dozen apples
1 basket of peaches
 $\frac{1}{2}$ dozen lemons
3. 1 dozen bananas
 $\frac{1}{2}$ dozen oranges
3 grapefruits
4. 1 dozen oranges
 $\frac{1}{2}$ dozen bananas
1 large basket of grapes
5. $\frac{1}{2}$ dozen lemons
4 grapefruits
1 dozen oranges
6. 1 basket of peaches
1 dozen apples
 $1\frac{1}{2}$ dozen bananas
7. 2 grapefruits
1 dozen bananas
 $\frac{1}{2}$ dozen oranges
8. 1 large basket of grapes
4 grapefruits
6 oranges
9. 1 small basket of grapes
9 apples
15 oranges
10. 1 basket peaches
 $\frac{1}{2}$ dozen oranges
 $\frac{1}{2}$ dozen apples
11. Make examples about what you would buy at this fruit store. Tell what coins you would use to pay with and what change you would get. See who can make the most interesting examples.



Chicken 24¢	Round steak 20¢
Porterhouse 28¢	Boiled ham 40¢
Frankfurters 16¢	Lamb chops 26¢

ORAL AND WRITTEN EXERCISES

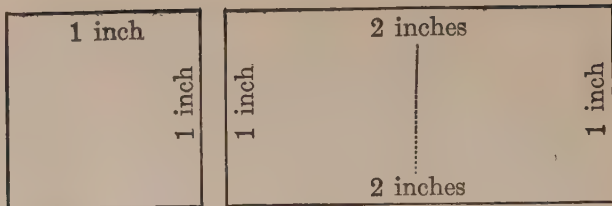
1. What is the cost of a chicken weighing $3\frac{1}{2}$ pounds?

The cost of 3 pounds is $3 \times 24¢$, or 72¢. The cost of half a pound is $\frac{1}{2}$ of 24¢, or 12¢. The cost of $3\frac{1}{2}$ pounds is 72¢ + 12¢, or 84¢.

Find the cost of each of the following purchases.

2. $1\frac{1}{2}$ pounds of porterhouse
 $\frac{1}{2}$ pound of frankfurters
3. A chicken weighing $4\frac{3}{4}$ pounds
 $\frac{1}{2}$ pound of cold boiled ham
4. $1\frac{3}{4}$ pounds of round steak
5. 2 pounds of lamb chops
 $\frac{1}{4}$ pound of boiled ham
6. $1\frac{1}{4}$ pounds of porterhouse
 $1\frac{3}{4}$ pounds of round steak

7. Make out sales checks for some of the above purchases.



ORAL AND WRITTEN EXERCISES

How long and how wide is each of the above figures?

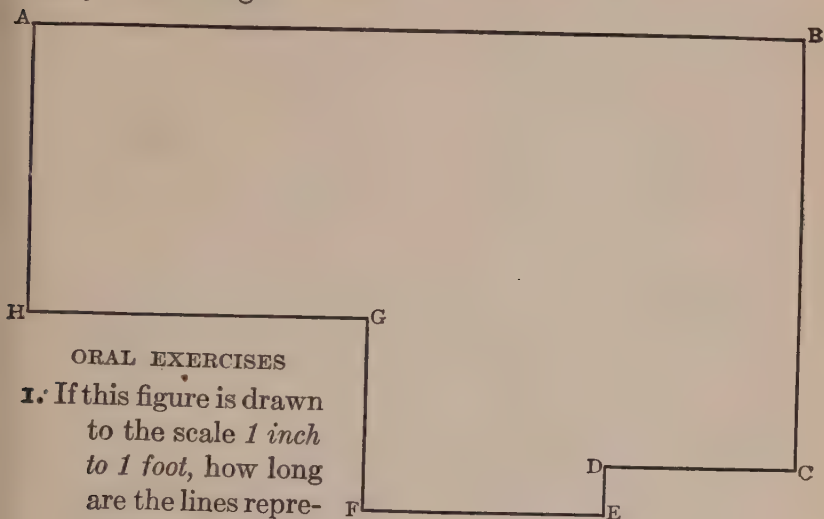
1. If the figure to the left represents 1 square foot, what does the figure to the right represent?
2. Draw a figure 3 inches wide by 6 inches long. If 1 inch represents 2 feet, what length is represented by the sides of this figure?
3. The top of a certain table is 3 feet wide and 5 feet long. Make a drawing of it, letting 1 inch represent 1 foot. How long will the drawing be?

If 1 inch represents 1 foot, we say the *scale* of drawing is "1 inch to 1 foot." If 1 inch represents 8 feet the scale is "1 inch to 8 feet."

4. Draw a figure $2\frac{1}{2}$ inches wide by $4\frac{1}{2}$ inches long. If this is a drawing of a table to the scale 1 inch to 1 foot, what are the dimensions of the table?
5. Make a drawing to the scale *1 inch to 1 foot* representing a door $2\frac{1}{2}$ feet wide and $6\frac{1}{2}$ feet high.
6. Make a drawing to the scale *1 inch to 1 foot* representing a window $3\frac{1}{2}$ feet wide and 5 feet high.

Drill in Fundamentals. Play a game like that on page 91, using examples in subtraction.

On maps you will usually find a scale given. This is true also of drawings representing buildings, streets, and a great many other things.



ORAL EXERCISES

1. If this figure is drawn to the scale *1 inch to 1 foot*, how long are the lines represented by AB, BC, CD, DE, EF, FG, GH, HA?
2. If this figure is drawn to the scale *1 inch to 12 feet* how long are the lines represented by AB, BC, CD, DE, EF, FG, GH, HA?
3. If this figure is drawn to the scale *1 inch to 16 feet* how long is each of the lines AB, BC, CD, DE, EF, FG, GH, HA?

WRITTEN EXERCISES

1. Draw a rectangle representing your schoolroom, to the scale *1 inch to 6 feet*. Make it as nearly accurate as you can.
2. The teacher will help you to make a drawing to scale representing your school program.

WRITTEN EXERCISES

Copy the following and see how long it takes you to add them:

1. 97472	2. 34125	3. 210	4. 29782
8641	6789	63	9647
91040	2014	826	23480
352	305	267	1940
476	6543	9432	7123
<u>8420</u>	<u>821</u>	<u>491</u>	<u>621</u>

Copy the following and subtract:

5. 97470	6. 9104	7. 8034	8. 34125
<u>8596</u>	<u>3052</u>	<u>6479</u>	<u>17908</u>
9. 21046	10. 29782	11. 2348	12. 7123
<u>9437</u>	<u>9747</u>	<u>1940</u>	<u>697</u>
13. 31502	14. 27040	15. 19400	16. 40190
<u>16481</u>	<u>25287</u>	<u>2746</u>	<u>24632</u>

Copy the following and multiply:

17. 491	18. 2120	19. 7654	20. 20910
<u>617</u>	<u>679</u>	<u>408</u>	<u>978</u>
21. 2840	22. 3292	23. 4789	24. 8463
<u>760</u>	<u>274</u>	<u>965</u>	<u>204</u>

Drill in Fundamentals. Play the game on page 195, using examples like $7 \times 8 = ?$ for the first event, examples like $\frac{1}{4}$ of $63 = ?$ for the second event, and examples like $56 \div 8 = ?$ for the third event. Run off one event each day.

WRITTEN EXERCISES

1. In a large orchard there are 56 rows of apple trees with 36 trees in each row. How many apple trees are there in this orchard?
2. How many bushels of apples are picked from an orchard containing 1850 apple trees if they yield 3 bushels per tree?
3. At 85 cents per bushel what is the selling price of 4640 bushels of apples?
4. How many square yards are there in a sidewalk 2 yards wide by 160 yards long?
5. At \$1.30 a square yard, find the cost of laying 320 square yards of concrete sidewalk.
6. A man figures that it costs on an average 7 cents a mile to run a small automobile. How much does it cost him to run it 7846 miles?
7. At 12 cents a mile for all expenses, what is the cost of running a heavy touring car 9840 miles?
8. At \$4.25 a day how much will a man earn in 312 days?
9. A hotel bought 56 pounds of butter at 32 cents a pound, 36 dozen eggs at 27 cents a dozen, 148 pounds of turkey at 23 cents, and 274 pounds of beef at 17 cents. How much did each of these items cost? How much did these things all cost?
10. A boy buys newspapers at the rate of \$1.40 a hundred and sells them at 2 cents apiece. One week he sold 600 papers. How much did they cost him? For how much did he sell them?

ORAL AND WRITTEN EXERCISES

1. Draw a line on the board and divide it into 4 equal parts.
What fraction of the line is each part? How do you write this fraction?
2. How many 4ths are there in 1?
3. Draw a line and divide it into 5 equal parts. What fraction of the line is each part? How do you write this fraction?
4. How many 5ths are there in 1? In 2? In 3?
5. Divide a line into fifths and show $\frac{3}{5}$, $\frac{4}{5}$, $\frac{2}{5}$.

One or more of the equal parts of a thing is called a *fraction* of the thing.
One or more of the equal parts of a number is called a fraction of the number.

The *denominator* of a fraction, written below the line, tells into how many parts a thing or number has been divided, and the *numerator*, written above the line, tells how many of these parts are taken.

6. Draw lines and divide them to show the meaning of $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{8}$, $\frac{4}{5}$, $\frac{1}{6}$, $\frac{2}{6}$, $\frac{3}{8}$, $\frac{4}{6}$, $\frac{5}{6}$.
7. Draw a line 12 inches long. On it show $\frac{1}{2}$ of 12, $\frac{1}{3}$ of 12, $\frac{1}{4}$ of 12.
8. On the same line show $\frac{2}{3}$ of 12, $\frac{3}{4}$ of 12, $\frac{1}{6}$ of 12, $\frac{5}{6}$ of 12.
9. How many inches are there in one foot? In $\frac{1}{2}$ of a foot? In $\frac{1}{3}$ of a foot? In $\frac{2}{3}$ of a foot? In $\frac{1}{4}$ of a foot? In $\frac{3}{4}$ of a foot?

ORAL EXERCISES

Read the following and supply the missing numbers:

- | | | |
|---------------------------|----------------------------|----------------------------|
| 1. $\frac{1}{4}$ of 8 = ? | 2. $\frac{4}{5}$ of 10 = ? | 3. $\frac{1}{2}$ of 14 = ? |
| $\frac{3}{4}$ of 8 = ? | $\frac{1}{3}$ of 12 = ? | $\frac{1}{7}$ of 14 = ? |
| $\frac{1}{5}$ of 10 = ? | $\frac{2}{3}$ of 12 = ? | $\frac{2}{7}$ of 14 = ? |
| $\frac{2}{5}$ of 10 = ? | $\frac{1}{4}$ of 12 = ? | $\frac{3}{7}$ of 14 = ? |
| $\frac{3}{5}$ of 10 = ? | $\frac{3}{4}$ of 12 = ? | $\frac{4}{7}$ of 14 = ? |

- | | | |
|----------------------------|----------------------------|----------------------------|
| 4. $\frac{5}{7}$ of 14 = ? | 5. $\frac{3}{8}$ of 16 = ? | 6. $\frac{4}{9}$ of 18 = ? |
| $\frac{6}{7}$ of 14 = ? | $\frac{5}{8}$ of 16 = ? | $\frac{5}{9}$ of 18 = ? |
| $\frac{1}{4}$ of 16 = ? | $\frac{7}{8}$ of 16 = ? | $\frac{7}{9}$ of 18 = ? |
| $\frac{3}{4}$ of 16 = ? | $\frac{1}{9}$ of 18 = ? | $\frac{8}{9}$ of 18 = ? |
| $\frac{1}{8}$ of 16 = ? | $\frac{2}{9}$ of 18 = ? | $\frac{1}{4}$ of 20 = ? |

- | | | |
|----------------------------|----------------------------|----------------------------|
| 7. $\frac{3}{4}$ of 20 = ? | 8. $\frac{1}{7}$ of 21 = ? | 9. $\frac{6}{7}$ of 21 = ? |
| $\frac{1}{5}$ of 20 = ? | $\frac{2}{7}$ of 21 = ? | $\frac{1}{4}$ of 24 = ? |
| $\frac{2}{5}$ of 20 = ? | $\frac{3}{7}$ of 21 = ? | $\frac{3}{4}$ of 24 = ? |
| $\frac{3}{5}$ of 20 = ? | $\frac{4}{7}$ of 21 = ? | $\frac{1}{3}$ of 24 = ? |
| $\frac{4}{5}$ of 20 = ? | $\frac{5}{7}$ of 21 = ? | $\frac{2}{3}$ of 24 = ? |

- | | | |
|-----------------------------|-----------------------------|-----------------------------|
| 10. $\frac{1}{6}$ of 24 = ? | 11. $\frac{1}{3}$ of 27 = ? | 12. $\frac{1}{4}$ of 28 = ? |
| $\frac{5}{6}$ of 24 = ? | $\frac{2}{3}$ of 27 = ? | $\frac{3}{4}$ of 28 = ? |
| $\frac{1}{8}$ of 24 = ? | $\frac{1}{9}$ of 27 = ? | $\frac{1}{5}$ of 30 = ? |
| $\frac{3}{8}$ of 24 = ? | $\frac{5}{9}$ of 27 = ? | $\frac{2}{5}$ of 30 = ? |
| $\frac{5}{8}$ of 24 = ? | $\frac{7}{9}$ of 27 = ? | $\frac{3}{5}$ of 30 = ? |
| $\frac{7}{8}$ of 24 = ? | $\frac{8}{9}$ of 27 = ? | $\frac{4}{5}$ of 30 = ? |

- | | | |
|-----------------------------|-----------------------------|-----------------------------|
| 13. $\frac{1}{6}$ of 30 = ? | 14. $\frac{1}{9}$ of 36 = ? | 15. $\frac{1}{5}$ of 40 = ? |
| $\frac{5}{6}$ of 30 = ? | $\frac{4}{9}$ of 36 = ? | $\frac{3}{5}$ of 40 = ? |
| $\frac{1}{4}$ of 32 = ? | $\frac{5}{9}$ of 36 = ? | $\frac{1}{8}$ of 40 = ? |
| $\frac{3}{4}$ of 32 = ? | $\frac{7}{9}$ of 36 = ? | $\frac{3}{8}$ of 40 = ? |
| $\frac{1}{8}$ of 32 = ? | $\frac{1}{4}$ of 40 = ? | $\frac{5}{8}$ of 40 = ? |
| $\frac{5}{8}$ of 32 = ? | $\frac{3}{4}$ of 40 = ? | $\frac{7}{8}$ of 40 = ? |

WRITTEN EXERCISES

Add the following:

1. 4971	2. 397	3. 1379	4. 1084
904	8432	6789	839
3700	654	3210	91
142	78	2345	5371
36	2109	284	289
<u>25</u>	<u>2468</u>	<u>196</u>	<u>1742</u>

5. 1402	6. 927	7. 6450	8. 4911
3256	8986	997	924
4007	3570	418	978
1799	934	891	3808
34	16	232	1723
<u>862</u>	<u>422</u>	<u>73</u>	<u>51</u>

Multiply the following:

9. 498	10. 2094	11. 734	12. 5407
<u>36</u>	<u>89</u>	<u>53</u>	<u>685</u>
13. 8590	14. 4930	15. 7842	16. 2540
<u>275</u>	<u>296</u>	<u>397</u>	<u>652</u>
17. 3702	18. 4503	19. 1245	20. 3782
<u>309</u>	<u>471</u>	<u>189</u>	<u>243</u>

Drills in Fundamentals. Select teams for a cross-country race, as on page 91. Run one race today, using examples in addition, and another tomorrow, using examples in multiplication. The team which has the lowest total score for the two races wins. If your team has a high score for the first race, you must drill on multiplication, so as to get a lower score in the second race.

WRITTEN EXERCISES

1. What is the cost of 100 three-cent stamps, 200 two-cent stamps and 100 one-cent stamps?
2. In a logging camp there are 276 horses. How many horseshoes are needed to shoe all these horses once?
3. Working in the shipyards during the war a man earned \$7.50 a day. How much did he earn in 174 days?
4. Charlie's father had 127 chickens, and sold 74 of them. How many had he left?
5. One schoolroom is 27 feet wide and 36 feet long, and another is 30 feet wide and 33 feet long. Find the number of square feet in each of these. Which is the larger, and how much?
6. A skilled workman gets \$6.50 a day, and a common laborer gets \$2.25 a day. How much less than the skilled workman does the laborer earn in one day? How much less does he earn in one month of 26 working days?
7. If one quart of ice cream is enough to serve 6 people, how many quarts are needed at a picnic where there are 52 people?
8. On one trip a street car conductor takes in 87 cash fares. How much money is this if one fare is 5 cents?
9. Make and solve problems like problem 5 on this page. See who can make the most interesting problems.
10. Make and solve problems like problem 6 on this page. Does it pay to become a skilled worker?
11. Make and solve problems about how many sandwiches are needed for a picnic.

Example 1. Divide 246 by 6.

$\overline{41}$ *Tens:* $24 \div 6 = 4$. Write 4.

6)246 *Ones:* $6 \div 6 = 1$. Write 1.

Notice that the figure 4 in the quotient is written directly above the figure 4 in the dividend. That is, the first figure in the quotient is written directly above the last figure of that part of the dividend which is used in the first step.

Example 2. Divide 135 by 3.

$\overline{45}$ *Tens:* $13 \div 3 = 4$, remainder 1. Write 4.

3)135 *Ones:* $15 \div 3 = 5$. Write 5.

The figure 4 in the quotient is written directly above the figure 3 in the dividend. Why is this done?

Example 3. Divide 1744 by 8.

$\overline{218}$ *Hundreds:* $17 \div 8 = 2$, remainder 1. Write 2.

8)1744 *Tens:* $14 \div 8 = 1$, remainder 6. Write 1.

Ones: $64 \div 8 = 8$. Write 8.

WRITTEN EXERCISES

Divide the following:

- | | | | | |
|----|---------------------|---------------------|---------------------|---------------------|
| 1. | $\overline{4)368}$ | $\overline{5)455}$ | $\overline{6)546}$ | $\overline{7)833}$ |
| 2. | $\overline{8)488}$ | $\overline{7)329}$ | $\overline{7)427}$ | $\overline{9)639}$ |
| 3. | $\overline{3)1161}$ | $\overline{3)1785}$ | $\overline{3)1428}$ | $\overline{3)1326}$ |
| 4. | $\overline{4)1348}$ | $\overline{4)7356}$ | $\overline{4)3764}$ | $\overline{4)1976}$ |
| 5. | $\overline{5)3905}$ | $\overline{5)3420}$ | $\overline{5)1875}$ | $\overline{5)2475}$ |
| 6. | $\overline{6)1362}$ | $\overline{6)4632}$ | $\overline{6)5130}$ | $\overline{6)4356}$ |
| 7. | $\overline{7)1946}$ | $\overline{7)6153}$ | $\overline{7)2366}$ | $\overline{7)3283}$ |

Example 1. Divide 537 by 6.

89, remainder 3. *Tens:* $53 \div 6 = 8$, remainder 5.

6 $\overline{)537}$

Write 8.

Test:

89
6
534
3
537

Ones: $57 \div 6 = 9$, remainder 3.

Write 9.

To test, multiply 89 by 6, and add the remainder.

Example 2. Divide 3546 by 7. 506, remainder 4.

7 $\overline{)3546}$

Hundreds: $35 \div 7 = 5$, remainder 0. Write 5.

Tens: $4 \div 7 = 0$, remainder 4 Write 0.

Ones: $46 \div 7 = 6$, remainder 4. Write 6. The quotient is 506, and remainder 4.

WRITTEN EXERCISES

Divide each of the following and test the results:

1. $9 \overline{)846}$

5 $\overline{)274}$

8 $\overline{)347}$

6 $\overline{)515}$

2. $7 \overline{)431}$

4 $\overline{)315}$

5 $\overline{)462}$

9 $\overline{)621}$

3. $8 \overline{)3905}$

7 $\overline{)5900}$

6 $\overline{)4003}$

8 $\overline{)9175}$

4. $8 \overline{)467}$

7 $\overline{)6070}$

6 $\overline{)7133}$

3 $\overline{)4902}$

5. $9 \overline{)8050}$

7 $\overline{)5748}$

9 $\overline{)5947}$

7 $\overline{)8900}$

6. $4 \overline{)9047}$

5 $\overline{)8021}$

7 $\overline{)9610}$

9 $\overline{)7649}$

7. $6 \overline{)3191}$

3 $\overline{)1825}$

7 $\overline{)5632}$

6 $\overline{)3134}$

8. $4 \overline{)2913}$

5 $\overline{)5361}$

8 $\overline{)3471}$

4 $\overline{)5849}$

9. $5 \overline{)6743}$

6 $\overline{)3719}$

9 $\overline{)1744}$

7 $\overline{)7346}$

WRITTEN EXERCISES

1. The number of children attending a certain school for one week was:

Monday.....	846	Add these numbers and divide the sum by 5. The quotient is the <i>average</i> daily attendance for the week. We divide by 5 because 5 numbers were added. If we add the attendance for 20 days, the sum must be divided by 20 to get the average for that time.
Tuesday.....	852	
Wednesday...	845	
Thursday.....	860	
Friday.....	842	

In two other schools the attendance for one week was:

2. The John Marshall:

Monday.....	1484
Tuesday.....	1506
Wednesday.....	1512
Thursday.....	1502
Friday.....	1481

3. The Calhoun:

Monday.....	672
Tuesday.....	691
Wednesday.....	693
Thursday.....	680
Friday.....	674

Find the average daily attendance at each of these schools for the week.

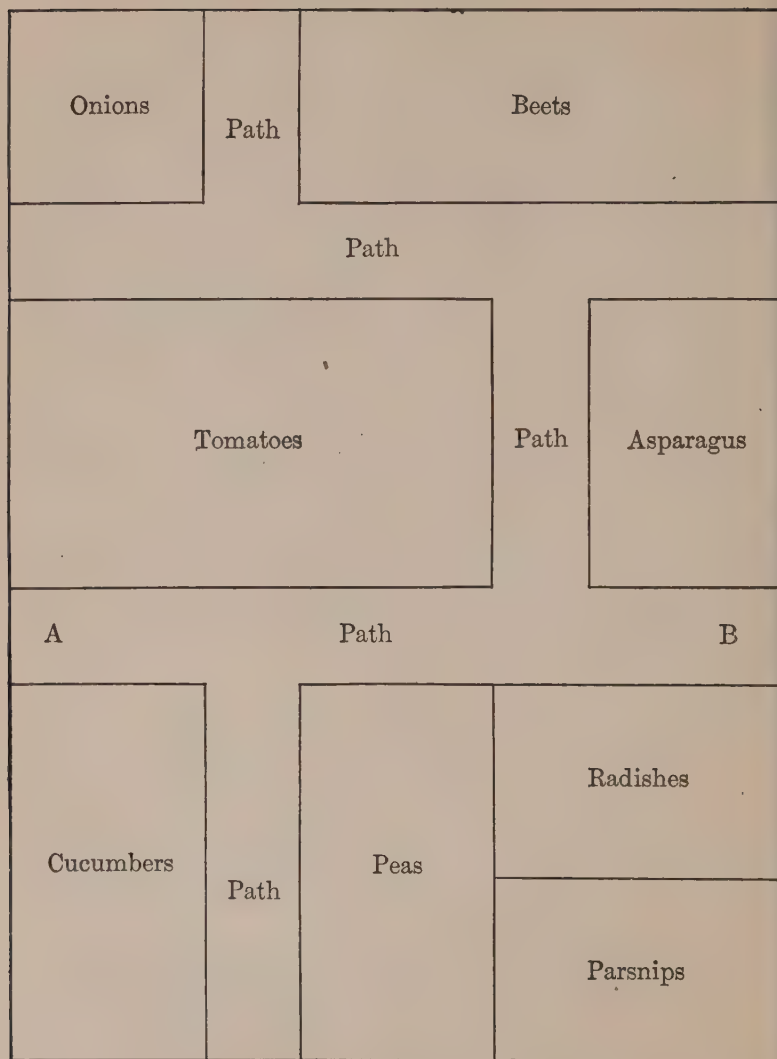
4. Ask the teacher what the attendance in your room was each day last week. Then find the average daily attendance.
5. At a series of baseball games the attendance was: 8685, 9424, 12802, 23689.

Find the average attendance for these four days.

6. A farmer sold 6 horses at the following prices: \$130, \$185, \$150, \$165, \$200, \$160. What was the average price of these horses?
7. If 8 pigs sold for \$216, what was the average price?

ORAL EXERCISES

1. How could you find the average daily attendance in your school for 20 days?
2. John and Harry have some money. How can you find how much more one has than the other?
3. How can you find how many school children there are in a 10-room building?
4. Your mother bought some cloth. If she tells you how many yards she bought and how much she paid per yard how can you find how much the cloth cost her?
5. If you measure one side of a square how can you find the distance around the square?
6. Tom has some money and wants to buy a pair of skates. If he knows the price of the skates, how can he tell how much more money he must get to buy them?
7. A farmer wants to buy some horses. If he knows the price per head how can he tell how much the horses will cost?
8. How can you tell how much older a father is than his son?
9. A girl wants to buy five Christmas presents. How can she tell how much they will cost all together?
10. Tell some uses you know for large numbers.
11. If you know how old a man is how can you find in what year he was born?
12. A man hauling coal weighs the wagon with the coal on and then weighs the empty wagon. How can you tell how many pounds of coal he had on? Make and solve problems like this. Compare pages 118 and 119.



ORAL AND WRITTEN EXERCISES

On the diagram on the opposite page one inch represents 6 feet.

1. What are the dimensions of the beet bed? How many square feet are there in it? How many yards wide is it? How many yards long? How many square yards are there in it?
2. What are the dimensions of the onion bed in feet? How many square feet are there in it? How many square yards?
3. What are the dimensions of the tomato bed in feet? How many square feet are there in it? How many square yards?
4. How many square feet are there in the asparagus bed? How many square yards?
5. What are the dimensions of the radish bed? How many square yards are there in it?
6. What are the dimensions of the parsnip bed? How many square yards are there in it?
7. Give the dimensions of the cucumber bed. How many square yards are there in it?
8. How wide are the paths? How long is the path from A to B? How many square yards are there in this path?
9. How many square yards are there in the whole garden, including the paths?
10. If the vegetable beds cover 63 square yards, how much is covered by the paths?
11. Make problems about the peas bed.

WRITTEN EXERCISES

Copy the following examples and add them. Check by adding each column both ways.

1. 52346	2. 76895	3. 85679	4. 96432
52435	8957	59786	9873
324	98576	8568	7420
6532	57984	265	3190
<u>54623</u>	<u>652</u>	<u>35471</u>	<u>18462</u>
5. 65748	6. 89675	7. 97654	8. 27304
79854	543	8975	16413
860	40087	8973	29870
8476	37903	60087	61324
70549	9046	59856	4926
<u>94631</u>	<u>98007</u>	<u>887</u>	<u>39840</u>

Make the following subtractions, keeping account of the time which it takes:

9. 453621	10. 576814	11. 645234	12. 38704
<u>360453</u>	<u>287065</u>	<u>576428</u>	<u>12172</u>
13. 578091	14. 781046	15. 874063	16. 672400
<u>287496</u>	<u>693567</u>	<u>640785</u>	<u>126382</u>
17. 70504	18. 81030	19. 904160	20. 397026
<u>36085</u>	<u>68947</u>	<u>736974</u>	<u>129142</u>
21. 87003	22. 907631	23. 79087	24. 73400
<u>70894</u>	<u>578908</u>	<u>59898</u>	<u>46198</u>
25. 94201	26. 5746	27. 78401	28. 19846
<u>24274</u>	<u>4193</u>	<u>34719</u>	<u>2948</u>

WRITTEN EXERCISES

Copy the following examples. Then see how long it takes you to make the multiplications.

1. $\begin{array}{r} 86954 \\ 467 \\ \hline \end{array}$	2. $\begin{array}{r} 79506 \\ 547 \\ \hline \end{array}$	3. $\begin{array}{r} 87954 \\ 638 \\ \hline \end{array}$	4. $\begin{array}{r} 96785 \\ 657 \\ \hline \end{array}$
--	--	--	--

5. $\begin{array}{r} 95874 \\ 578 \\ \hline \end{array}$	6. $\begin{array}{r} 78970 \\ 659 \\ \hline \end{array}$	7. $\begin{array}{r} 89705 \\ 708 \\ \hline \end{array}$	8. $\begin{array}{r} 38965 \\ 980 \\ \hline \end{array}$
--	--	--	--

9. $\begin{array}{r} 8976 \\ 895 \\ \hline \end{array}$	10. $\begin{array}{r} 9784 \\ 878 \\ \hline \end{array}$	11. $\begin{array}{r} 7869 \\ 984 \\ \hline \end{array}$	12. $\begin{array}{r} 9567 \\ 893 \\ \hline \end{array}$
---	--	--	--

13. $\begin{array}{r} 7041 \\ 391 \\ \hline \end{array}$	14. $\begin{array}{r} 6394 \\ 472 \\ \hline \end{array}$	15. $\begin{array}{r} 2530 \\ 843 \\ \hline \end{array}$	16. $\begin{array}{r} 3987 \\ 258 \\ \hline \end{array}$
--	--	--	--

Divide the following, giving both the quotients and the remainders:

17. $4 \overline{)48062}$	18. $5 \overline{)7500}$	19. $6 \overline{)87405}$
---------------------------	--------------------------	---------------------------

20. $7 \overline{)334927}$	21. $8 \overline{)456483}$	22. $9 \overline{)478200}$
----------------------------	----------------------------	----------------------------

23. $9 \overline{)806409}$	24. $7 \overline{)937028}$	25. $8 \overline{)850920}$
----------------------------	----------------------------	----------------------------

26. $8 \overline{)940780}$	27. $9 \overline{)870640}$	28. $9 \overline{)980600}$
----------------------------	----------------------------	----------------------------

29. $6 \overline{)1893000}$	30. $4 \overline{)1437089}$	31. $8 \overline{)1406085}$
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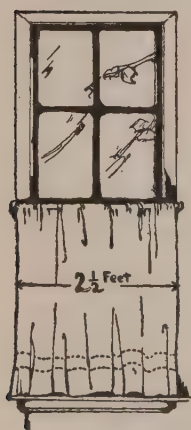
32. $5 \overline{)8704}$	33. $8 \overline{)8964}$	34. $4 \overline{)67791}$
--------------------------	--------------------------	---------------------------

35. $7 \overline{)5938}$	36. $6 \overline{)4257}$	37. $7 \overline{)19784}$
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Drill in Fundamentals. Choose teams for a field meet and play as on page 195. The first event will be in addition, the second in subtraction, the third in multiplication, and the fourth in division.

ORAL AND WRITTEN EXERCISES

1. How many inches are there in one yard? In a half-yard?
2. If linen handkerchiefs are cut 18 inches long and 18 inches wide before hemming, how many can be made from a piece of linen one yard square?
3. How many handkerchiefs like those of Example 2 can be made from a piece 1 yard wide and 3 yards long?
4. How many ladies' handkerchiefs each 12 inches square before hemming can be cut from a piece of linen 1 yard square?
5. How many handkerchiefs like those of Example 4 can be made from a piece of linen 1 yard wide and 2 yards long?
6. How many ladies' handkerchiefs each 9 inches square can be cut from a piece of linen 1 yard square?



7. How wide a sash curtain is needed for this window, if it is made twice as wide as the window to allow for fulness?
8. A tablecloth 72 inches wide, is how many feet wide? How many yards?
9. How many feet of sheeting are required to make 2 sheets, each $7\frac{1}{2}$ feet long before hemming? How many yards is this? It is understood that the sheeting is the same width as the sheets.
10. If it takes $2\frac{1}{2}$ yards of goods to make an apron for one of the girls in a cooking class, how much goods will it take to make aprons for 4 girls?

ORAL AND WRITTEN EXERCISES

1. Draw a rectangle 6 inches long and 4 inches wide. Divide it into square inches. How many square inches are there in it? Could you find this without counting? How?
2. How many square inches are there in a sheet of paper 9 inches long and 6 inches wide?

You can easily understand that we cannot find the area of a large surface by dividing it up into squares and counting them, because that would take too much time.

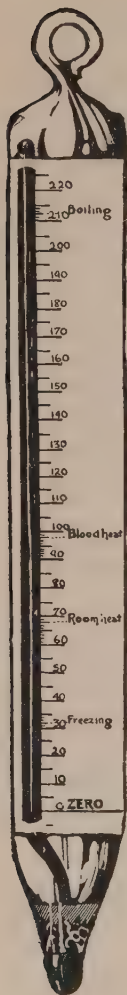
*To find the area of a rectangle in square feet,
multiply its length in feet by its width
in feet.*

*To find the area of a rectangle in square yards,
multiply its length in yards by its width
in yards.*

3. How long is your blackboard? How wide? Find its area in square feet.
4. Give a rule for finding the number of square inches in a rectangle.
5. Find the number of square inches in the top of your desk.
6. How many square yards are there in a rug 3 yards wide by 4 yards long? At \$3.50 a square yard, how much is this rug worth?
7. How many square yards are there in a rug 6 feet wide by 9 feet long? At \$5.25 a square yard, how much is this rug worth?
8. If you know the length of a rectangle in feet and width in yards, how do you find its area in square feet?

ORAL AND WRITTEN EXERCISES

Answer as many as you can of the following questions without using pencil and paper.



1. How many degrees above zero is the freezing point?
2. How many degrees above zero is blood heat?
3. How many degrees above the room temperature is blood heat?
4. How many degrees are there between the freezing point and blood heat?
5. How many degrees are there between blood heat and the boiling point?
6. How many degrees above zero is the boiling point?
7. How many degrees above freezing is the boiling point?
8. One year the lowest temperature in Boston was 24° below zero, and the highest was 97° above zero. What is the difference between these temperatures?
9. What is the highest temperature you ever saw on the thermometer? The lowest? What is the difference between these?
10. What is the temperature which is half-way between the boiling and the freezing points? Point out this temperature on the thermometer.

WRITTEN WORK

1. A railway train runs from New York through Albany to Buffalo. In going from New York to Albany the train runs 143 miles, while in going from New York to Buffalo it runs 440 miles. How many miles are there from Albany to Buffalo?
2. If there are 897 girls and 689 boys in a certain school, how many more girls than boys are there in this school? How many pupils are there altogether in the school?
3. If you buy goods for \$1.78, what change do you get from a five-dollar bill?
4. If you receive \$4.24 in change from a ten-dollar bill, what was the amount of your purchase?
5. In what year was a man born who is 45 years old now?
6. Lincoln died in 1865. How many years ago was that?
7. A man received \$1600 a year in salary. He spent \$280 a year for rent, \$310 for table board, \$175 for clothing, \$350 for tools, \$250 for other purposes, and saved the rest. How much did he spend for all these? How much did he save?
8. A drawing 8 inches long and 2 inches wide, represents a city lot. What are the dimensions of the lot if 1 inch represents 15 feet? Find the number of square feet in this lot.
9. If the daily attendance in a certain school for one week is 485, 508, 512, 497, 498, what is the average daily attendance for that week?
10. How old is a man now if he was born in the year 1867?
11. Make other problems like Problem 10 and solve them.

WRITTEN WORK

1. General Grant was born in the year 1822, and died in the year 1885. How old was he at the time of his death?
2. How many years ago was General Grant born? How many years ago did he die?
3. Lincoln was born in the year 1809, and died in the year 1865. How old was he at the time of his death?
4. A school yard is 170 feet by 180 feet. What length of fence is required to go around it?
5. A room is 15 feet long and 12 feet wide. How long is the picture molding around it?
6. How many square yards of carpet are required for a room 5 yards by 4 yards?
7. If oranges sell at the rate of 3 for 10 cents, how much will one dozen oranges cost?
8. At the rate of 2 for 5 cents, how much will one dozen oranges cost?
9. If you buy 2 dozen bananas and get 40 cents change from a one-dollar bill, how much do you pay for the bananas? At this rate what is the cost of one dozen bananas? Of a half-dozen?
10. Six men do some work for \$336. How much does each receive if this is divided equally.
11. If the picture molding around a square room is 56 feet long, what are the dimensions of the room?
12. A certain motor boat runs 11 miles on a gallon of gasoline. How many miles will it run on 6 gallons? How many miles will it run on 140 gallons?

WRITTEN WORK

1. Make out laundry bills for the following, using your mother's name and the name of your own laundry.
 - (a) 4 collars at 3¢, 2 shirts at 12¢, 1 nightshirt at 10¢, 2 pieces of underwear at 8¢, 2 pairs of socks at 4¢, 3 handkerchiefs at 2¢.
 - (b) One petticoat 30¢, 2 nightdresses at 15¢, 2 combination suits at 20¢, one wrapper 35¢.
 - (c) 16 towels at 4¢, 6 sheets at 5¢, 8 pillow cases at 3¢.
2. A lady bought a bill of goods for \$11.35, and gave the clerk a \$10 bill and a \$5 bill. How much change did she receive? How would the clerk count out the change?
3. A man owed \$34.47 at a store. He paid \$28.50. How much did he still owe?
4. During one summer season a certain motor boat ran 1712 miles. At 8 miles to the gallon, how many gallons of gasoline did it use?
5. Find the cost of 214 gallons of gasoline at 27 cents a gallon.
6. A farmer sold 7 bushels of potatoes at \$1.65, and 9 bushels at \$1.15. Which sale brought more money? How much?
7. A pane of glass is 18 inches wide by 27 inches long. How many square inches does it contain?
8. A rectangular drawing 4 inches wide and 7 inches long represents a garden. What are the dimensions of the garden if 1 inch represents 5 feet?
9. A lot is 48 feet wide and 120 feet long. How many square feet are there in this lot? How many square yards are there in it?

WRITTEN WORK

1. For a school entertainment 173 tickets were sold at 50 cents apiece, 218 tickets at 25 cents apiece, and 312 children's tickets at 10 cents. How much did the entertainment bring?
2. The expenses of the school entertainment of Problem 1 were as follows: Printing tickets and programs, \$12.50. Advertising, \$15. Running the stereopticon, \$2.50. Other expenses, \$11.40. What were the total expenses?
3. John has 95 cents in dimes and nickels. What is the smallest possible number of coins he can have?
4. If John has 90 cents in quarters, dimes and nickels, what is the smallest possible number of coins he can have?
5. Harry has \$1.45 in silver. What is the smallest possible number of coins he can have? Name the coins.
6. A farmer starting a stock farm buys 6 cows at \$85 apiece, 4 cows at \$75 apiece, and 7 cows at \$95 apiece. How much do all the cows cost him?
7. A farmer bought one horse for \$240, one for \$150, one for \$180, and two at \$160 per head. What was the cost of all these horses?
8. If sugar sells at the rate of 4 pounds for 25 cents, how much will 100 pounds cost when bought at this rate? How much does a woman save by buying a 100-pound sack of sugar for \$5.70?
9. At 64 cents a yard, what is the cost of 16 yards of cloth? If a twenty-dollar bill is used to pay for this cloth what is the change received? How would you count out this change?

CHAPTER V

REVIEW OF READING NUMBERS

Read the following numbers:

1. 859,047	61,009	14,080
807,040	3,340	59,040
6,347,000	187,640	917,300
1,843,000	5,940,074	6,937,421
3,106,830	1,603,894	4,314,700

For special purposes numbers are sometimes read in different ways. Thus, when 138 is used for a house number, it is read "one thirty-eight," 2476 is read "twenty-four, seventy-six," 5700 is read "fifty-seven hundred," while 4307 is read "forty-three O seven." The *O* is read "O" as in the alphabet, and not as zero.

2. Read the following numbers as house numbers are read:

7340	4590	2569	4325
6176	4972	8045	5700
6004	7400	5000	3407
1500	7002	3500	1370
5006	3700	5031	7640

Telephone numbers are read still another way. Thus, when 138 is used for a telephone number, it is read "One, three, eight," 2476 is read "two, four, seven, six," 405 is read "four, O, five." The *O* is read as "O" in the alphabet, and not as zero. 7800 is read "seven eight double O," and 3007 is read "three double O seven."

3. Read the numbers in Example 2 as telephone numbers are read.

WRITTEN EXERCISES

Copy and add the following:

1. 6947	2. 5820	3. 194	4. 55
280	340	8600	678
6240	6496	914	901
9000	348	37	2345
53	29	1740	6789
267	167	617	10234
82	8239	83	56789
907	390	2406	5371

Subtract and prove your results in the following:

5. 9147	6. 6300	7. 7842	8. 6070
6849	4126	5936	4869
9. 3406	10. 8190	11. 3851	12. 6378
2142	3476	1789	2496

Multiply:

13. 219	14. 734	15. 5910	16. 6408
86	76	282	294
17. 689	18. 4706	19. 3005	20. 7070
27	208	206	809

Divide and prove your results in the following:

21. 9 $\overline{)1276}$	22. 7 $\overline{)18240}$	23. 6 $\overline{)5274}$	24. 5 $\overline{)6172}$
25. 9 $\overline{)90047}$	26. 4 $\overline{)324789}$	27. 6 $\overline{)42347}$	28. 8 $\overline{)48024}$

Drill in Fundamentals. Play the game on page 195. Run two events, using examples in multiplication for the first event, and examples in division for the second.



ORAL EXERCISES

1. Do you know what game these boys are playing? How many play on each side? How many boys are required to form two football teams? Three teams? Four teams?
2. Count to 110 by 11's.
3. Read the following and supply the missing numbers:

$2 \times 11 = ?$	$5 \times 11 = ?$	$8 \times 11 = ?$
$3 \times 11 = ?$	$6 \times 11 = ?$	$9 \times 11 = ?$
$4 \times 11 = ?$	$7 \times 11 = ?$	$10 \times 11 = ?$
4. How many are there in one dozen? In 2 dozen? In 3 dozen? In 4 dozen?
5. Count to 120 by 12's.
6. Read the following and supply the missing numbers:

$2 \times 12 = ?$	$5 \times 12 = ?$	$8 \times 12 = ?$
$3 \times 12 = ?$	$6 \times 12 = ?$	$9 \times 12 = ?$
$4 \times 12 = ?$	$7 \times 12 = ?$	$10 \times 12 = ?$
7. What are the new number facts in these tables?

Study again the figure on page 133 and the number facts related to $7 \times 6 = 42$.

From $6 \times 11 = 66$ we know at once that $11 \times 6 = 66$, $\frac{1}{6}$ of $66 = 11$, $\frac{1}{11}$ of $66 = 6$, $66 \div 6 = 11$, $66 \div 11 = 6$.

ORAL AND WRITTEN EXERCISES

1. Write down each number fact in the table of 11's and state what other number facts are obtained from each.
2. Write down each number fact in the table of 12's and state what other number facts are obtained from each.
3. Give the missing numbers in the following:

$77 \div 11 = ?$	$110 \div 11 = ?$	$55 \div 11 = ?$
$48 \div 12 = ?$	$108 \div 9 = ?$	$84 \div 12 = ?$
$44 \div 4 = ?$	$22 \div 11 = ?$	$77 \div 7 = ?$
$72 \div 12 = ?$	$96 \div 12 = ?$	$72 \div 6 = ?$
$99 \div 9 = ?$	$66 \div 11 = ?$	$110 \div 10 = ?$
$24 \div 2 = ?$	$96 \div 8 = ?$	$60 \div 5 = ?$
$33 \div 3 = ?$	$55 \div 5 = ?$	$88 \div 11 = ?$
$48 \div 4 = ?$	$84 \div 7 = ?$	$120 \div 12 = ?$
$44 \div 11 = ?$	$60 \div 12 = ?$	$99 \div 11 = ?$
$36 \div 12 = ?$	$88 \div 8 = ?$	$108 \div 12 = ?$
$120 \div 10 = ?$	$66 \div 6 = ?$	$36 \div 12 = ?$

4. Make question cards and answer cards for the tables of 11's and 12's, and play the game on page 103.
5. Play the same game, using the cards for the 11's and 12's mixed with cards for the other tables.

Drill in Fundamentals. Play the game on page 71, using combinations like $\frac{1}{12}$ of $36 = ?$ The girls will play against the boys. Find the average number of mistakes for the boys and the average number for the girls. If necessary, the teacher will show how to find these.

We are now to learn a process called *long division*. It is exactly like short division, except that more of the work is written down.

We will first study this process in a simple example, which we can also work by short division. In this way we shall be able to see that there is nothing new in long division except that it saves the remembering of so many figures.

Example. Divide 674 by 8.

$ \begin{array}{r} 84 \text{ (quotient)} \\ 8 \overline{)674} \\ \underline{64} \\ 34 \\ \underline{32} \\ 2 \text{ (remainder)} \end{array} $	<i>Tens:</i> $67 \div 8 = 8$, remainder 3. Write 8 in quotient and bring down 4. <i>Ones:</i> $34 \div 8 = 4$, remainder 2. Write 4 in quotient.
---	--

The quotient is 84, and the remainder 2.

To find the first remainder multiply the divisor by the first figure of the quotient. That is, $8 \times 8 = 64$. Subtract the product from 67.

To find the second remainder multiply the divisor by the second figure of the quotient. That is, $4 \times 8 = 32$. Then subtract from 34.

WRITTEN EXERCISES

Solve each of the following by long division and also by short division, and study the two processes with care.

- | | | |
|------------------------|------------------------|-------------------------|
| 1. $6 \overline{)497}$ | 5. $6 \overline{)475}$ | 9. $8 \overline{)747}$ |
| 2. $7 \overline{)598}$ | 6. $9 \overline{)627}$ | 10. $6 \overline{)538}$ |
| 3. $8 \overline{)748}$ | 7. $9 \overline{)886}$ | 11. $7 \overline{)675}$ |
| 4. $5 \overline{)396}$ | 8. $4 \overline{)396}$ | 12. $9 \overline{)796}$ |

In practice long division is used only when the divisor is greater than 12.

We will now study the steps in long division more carefully by means of an example.

Example. Divide 884 by 21.

$$\begin{array}{r}
 42 \\
 21 \overline{)884} \\
 \underline{84} \\
 44 \\
 \underline{42} \\
 2
 \end{array}$$

Step 1. Find the first partial dividend. For the first dividend take just enough from the left of the given dividend so that the divisor is contained in it.

In this case 88 is the first partial dividend. 8 would be too small, and 884 would be larger than necessary.

Step 2. Estimate the quotient. In this case $88 \div 21 = 4$ with a remainder.

Step 3. Multiply the divisor by the estimated quotient. In this case $4 \times 21 = 84$.

Step 4. Compare product with first partial dividend.

If the product is greater than the first dividend, the quotient is too large.

Step 5. Subtract product.

If the remainder is less than the divisor, the quotient figure is correct; if not, the quotient is too small.

Step 6. Bring down one figure from the dividend to form the next partial dividend, and repeat the above steps.

Remember: *The product of the quotient figure and the divisor must not be greater than the partial dividend.*

Every remainder must be less than the divisor.

WRITTEN EXERCISES

Divide and explain all steps:

1. $21 \overline{)588}$

3. $21 \overline{)735}$

5. $21 \overline{)861}$

7. $21 \overline{)798}$

2. $21 \overline{)945}$

4. $21 \overline{)651}$

6. $21 \overline{)483}$

8. $21 \overline{)966}$

Example. Divide 987 by 42

$$\begin{array}{r}
 23 \text{ Tens: } 98 \div 42 = 2, \text{ with a remainder. Write } 2 \text{ in} \\
 42 \overline{)987} \quad \text{quotient.} \\
 \underline{84} \quad 2 \times 42 = 84. \text{ Subtract and bring down 7 for next} \\
 147 \quad \text{partial dividend.} \\
 \underline{126} \text{ Ones: } 147 \div 42 = 3, \text{ with a remainder. Write } 3 \text{ in} \\
 21 \quad \text{quotient.}
 \end{array}$$

The quotient is 23 and the remainder 21. Explain how the remainder is found. Compare short division.

Notice that, as in short division, the first figure of the quotient is placed directly above the last figure of the first partial dividend, in this case above the 8.

Test: $42 \times 23 = 966$ To test, multiply the divisor by the quotient and add the remainder. The result should be the dividend.

$$\begin{array}{r}
 42 \\
 \times 23 \\
 \hline
 126 \\
 84 \\
 \hline
 966 \\
 + 21 \\
 \hline
 987
 \end{array}$$

WRITTEN EXERCISES

Divide and test the following:

- | | | | |
|-------------------------|----------------------------|--------------------------|----------------------------|
| 1. $21 \overline{)876}$ | 7. $23 \overline{)863}$ | 13. $24 \overline{)932}$ | 19. $71 \overline{)986}$ |
| 2. $21 \overline{)594}$ | 8. $23 \overline{)785}$ | 14. $41 \overline{)814}$ | 20. $72 \overline{)894}$ |
| 3. $31 \overline{)765}$ | 9. $33 \overline{)834}$ | 15. $42 \overline{)976}$ | 21. $32 \overline{)916}^*$ |
| 4. $31 \overline{)418}$ | 10. $33 \overline{)398}$ | 16. $51 \overline{)876}$ | 22. $42 \overline{)746}$ |
| 5. $22 \overline{)926}$ | 11. $24 \overline{)794}^*$ | 17. $52 \overline{)934}$ | 23. $52 \overline{)876}$ |
| 6. $23 \overline{)989}$ | 12. $24 \overline{)875}^*$ | 18. $61 \overline{)828}$ | 24. $62 \overline{)917}$ |

234 QUOTIENT FIGURES FOR TWO-FIGURE DIVISORS

The most difficult step in long division is to estimate the figures of the quotient.

To estimate the quotient figure when the divisor is a two-figure number *take quotient of tens*.

Example 1. Divide 849 by 91.

9 There are 9 tens in 91 and 84 tens in 849.

$$\begin{array}{r} 91 \overline{)849} \\ \underline{819} \\ 30 \end{array}$$
 Since $84 \div 9 = 9$ with a remainder, we estimate 9 as the quotient figure. Is this correct? How do you know?

Use this method when the second figure of the divisor is small.

Sometimes this method gives a quotient figure 1 too large. Thus, in $812 \div 91$, the quotient figure apparently is 9, while on trial we find it to be 8. In estimating try to notice cases like this and make the correct estimate.

Example 2. Divide 746 by 89.

8 Since 89 is nearly 90, and since $74 \div 9 = 8$ with a remainder, we estimate 8 as the quotient figure.

$$\begin{array}{r} 89 \overline{)746} \\ \underline{712} \\ 34 \end{array}$$
 On multiplying and subtracting this proves correct.

Use this method when the second figure in the divisor is large.

Sometimes this method gives a quotient figure 1 too small.

ORAL AND WRITTEN EXERCISES

Estimate the quotients below. After having estimated all of them, test to see how many you have correct. Try to make the first estimate accurately and rapidly.

- | | | | |
|-------------------------|-------------------------|-------------------------|--------------------------|
| 1. $41 \overline{)392}$ | 4. $49 \overline{)334}$ | 7. $39 \overline{)289}$ | 10. $69 \overline{)628}$ |
| 2. $62 \overline{)471}$ | 5. $51 \overline{)378}$ | 8. $82 \overline{)786}$ | 11. $52 \overline{)478}$ |
| 3. $89 \overline{)651}$ | 6. $42 \overline{)237}$ | 9. $59 \overline{)414}$ | 12. $79 \overline{)689}$ |

Example 1. Divide 676 by 29.

$$\begin{array}{r}
 23 \\
 29 \overline{) 676} \\
 \underline{58} \\
 96 \\
 \underline{87} \\
 9
 \end{array}$$

Tens: $67 \text{ (tens)} \div 29 = 2 \text{ (tens)}$, remainder 9 (tens).
 Write 2. Bring down 6.
Ones: $96 \div 29 = 3$, remainder 9. Write 3.
 The quotient is 23, remainder 9.

Test: 23

29

207

46

667

9

676

Example 2. Divide 8476 by 39.

$$\begin{array}{r}
 217 \\
 39 \overline{) 8476} \\
 \underline{78} \\
 67 \\
 \underline{39} \\
 286 \\
 \underline{273} \\
 13
 \end{array}$$

Hundreds: $84 \div 39 = 2$, remainder 6. Write 2,
 bring down 7.
Tens: $67 \div 39 = 1$, remainder 28. Write 1,
 bring down 6.
Ones: $286 \div 39 = 7$, remainder 13. Write 7.
 The quotient is 217, remainder 13.

WRITTEN EXERCISES

Divide and test:

1. $49 \overline{) 814}$

9. $59 \overline{) 7964}$

17. $28 \overline{) 765}$

2. $48 \overline{) 536}$

10. $79 \overline{) 8792}$

18. $88 \overline{) 8432}$

3. $38 \overline{) 918}$

11. $89 \overline{) 9895}$

19. $49 \overline{) 969}$

4. $39 \overline{) 796}$

12. $98 \overline{) 1819}$

20. $58 \overline{) 674}$

5. $49 \overline{) 586}$

13. $99 \overline{) 9467}$

21. $68 \overline{) 892}$

6. $68 \overline{) 848}$

14. $38 \overline{) 8862}$

22. $79 \overline{) 9264}$

7. $58 \overline{) 648}$

15. $68 \overline{) 9964}$

23. $89 \overline{) 9889}$

8. $79 \overline{) 889}$

16. $78 \overline{) 8994}$

24. $99 \overline{) 1246}$

236 QUOTIENT FIGURES FOR TWO-FIGURE DIVISION

We have studied division by numbers like 41, 42, in which the second figure is small, and by numbers like 58, 59, in which the second figure is large. In these cases we have found it fairly easy to estimate the quotient figures.

With divisors such as 76 it is more difficult to estimate the quotient figures.

Example 1. Divide 613 by 76.

8 In this case it is not so easy to decide at once

$$\begin{array}{r} 76 \overline{)613} \\ 608 \\ \hline 5 \end{array}$$
 whether 8 or 7 is the correct quotient. If the
 dividend were a little smaller, as 604 for instance,
 the quotient would be 7.

Example 2. Divide 749 by 94.

7 In this case taking quotient of tens given, $74 \div 9 = 8$.

$$\begin{array}{r} 94 \overline{)749} \\ 658 \\ \hline 91 \end{array}$$
 But on multiplying we shall find $8 \times 94 = 752$,
 which is greater than the divisor, and hence 7 is
 the correct quotient figure.

When using divisors like those of Examples 1 and 2 we need to take special care to get the first estimate of the quotient figure correct.

ORAL AND WRITTEN EXERCISES

Estimate the quotients below, and make a list of your estimates. Then test to see how many are correct.

- | | | | |
|-------------------------|--------------------------|--------------------------|--------------------------|
| 1. $45 \overline{)365}$ | 8. $95 \overline{)725}$ | 15. $65 \overline{)573}$ | 22. $47 \overline{)424}$ |
| 2. $56 \overline{)427}$ | 9. $87 \overline{)572}$ | 16. $33 \overline{)267}$ | 23. $54 \overline{)459}$ |
| 3. $84 \overline{)726}$ | 10. $77 \overline{)257}$ | 17. $83 \overline{)726}$ | 24. $77 \overline{)564}$ |
| 4. $96 \overline{)627}$ | 11. $74 \overline{)478}$ | 18. $76 \overline{)627}$ | 25. $84 \overline{)781}$ |
| 5. $57 \overline{)472}$ | 12. $53 \overline{)506}$ | 19. $56 \overline{)514}$ | 26. $56 \overline{)476}$ |
| 6. $64 \overline{)534}$ | 13. $67 \overline{)394}$ | 20. $87 \overline{)814}$ | 27. $47 \overline{)381}$ |
| 7. $43 \overline{)245}$ | 14. $87 \overline{)276}$ | 21. $85 \overline{)777}$ | 28. $34 \overline{)276}$ |

Example 1. Divide 6328 by 84.

$$\begin{array}{r}
 75 \\
 84 \overline{)6328} \\
 \underline{588} \\
 448 \\
 \underline{420} \\
 28
 \end{array}$$

Tens: $632 \div 84 = 7$ (tens), remainder 44 (tens). Write 2. Bring down 8.
Ones: $448 \div 84 = 5$, remainder 28. Write 5.
 The quotient is 75, remainder 28.

Example 2. Divide 9876 by 57.

$$\begin{array}{r}
 173 \\
 57 \overline{)9876} \\
 \underline{57} \\
 417 \\
 \underline{399} \\
 186 \\
 \underline{171} \\
 15
 \end{array}$$

Hundreds: $98 \div 57 = 1$, remainder 41. Write 1. Bring down 7.
Tens: $417 \div 57 = 7$, remainder 18. Write 7. Bring down 6.
Ones: $186 \div 57 = 3$, remainder 15.
 The quotient is 173, remainder 15.

WRITTEN EXERCISES

Divide and test.

- | | | |
|---------------------------|----------------------------|----------------------------|
| 1. $54 \overline{)1794}$ | 13. $77 \overline{)4184}$ | 25. $57 \overline{)26892}$ |
| 2. $67 \overline{)4236}$ | 14. $45 \overline{)3758}$ | 26. $67 \overline{)7842}$ |
| 3. $84 \overline{)5791}$ | 15. $44 \overline{)3189}$ | 27. $77 \overline{)74818}$ |
| 4. $56 \overline{)892}$ | 16. $37 \overline{)8594}$ | 28. $87 \overline{)74426}$ |
| 5. $43 \overline{)943}$ | 17. $75 \overline{)3468}$ | 29. $97 \overline{)28462}$ |
| 6. $64 \overline{)2487}$ | 18. $86 \overline{)14978}$ | 30. $84 \overline{)7859}$ |
| 7. $87 \overline{)3986}$ | 19. $76 \overline{)19862}$ | 31. $94 \overline{)59378}$ |
| 8. $93 \overline{)5284}$ | 20. $37 \overline{)2689}$ | 32. $74 \overline{)25492}$ |
| 9. $85 \overline{)3194}$ | 21. $43 \overline{)9876}$ | 33. $64 \overline{)37476}$ |
| 10. $95 \overline{)1864}$ | 22. $53 \overline{)37914}$ | 34. $54 \overline{)8573}$ |
| 11. $97 \overline{)4976}$ | 23. $63 \overline{)18462}$ | 35. $44 \overline{)8913}$ |
| 12. $66 \overline{)6287}$ | 24. $74 \overline{)26482}$ | 36. $34 \overline{)15978}$ |

Example 1. Divide 39804 by 76.

$$\begin{array}{r}
 523 \\
 76 \overline{)39804} \\
 \underline{380} \\
 180 \\
 \underline{152} \\
 284 \\
 \underline{228} \\
 56
 \end{array}$$

Notice that the zero in the dividend is brought down just like any other figure.

The quotient is 523; remainder 56.

Example 2. Divide 78106 by 86.

$$\begin{array}{r}
 908 \\
 86 \overline{)78106} \\
 \underline{774} \\
 706 \\
 \underline{688} \\
 18
 \end{array}$$

Hundreds: $781 \div 86 = 9$ with a remainder. Write 9.
Tens: $70 \div 86 = 0$ with a remainder. Write 0.
Ones: $706 \div 86 = 8$ with a remainder. Write 8.

If after bringing down a figure the partial dividend is still less than the divisor, write 0 in the quotient and bring down another figure from the dividend.

WRITTEN EXERCISES

Divide:

1. $74 \overline{)87600}$

8. $79 \overline{)233451}$

15. $76 \overline{)2078}$

2. $68 \overline{)70435}$

9. $35 \overline{)18083}$

16. $67 \overline{)2320}$

3. $38 \overline{)41563}$

10. $45 \overline{)27405}$

17. $33 \overline{)132066}$

4. $67 \overline{)13852}$

11. $53 \overline{)106389}$

18. $27 \overline{)2067}$

5. $35 \overline{)73621}$

12. $26 \overline{)53187}$

19. $56 \overline{)168224}$

6. $48 \overline{)97534}$

13. $58 \overline{)4908}$

20. $72 \overline{)3514}$

7. $54 \overline{)58342}$

14. $43 \overline{)1128}$

21. $48 \overline{)240240}$

Example 1. Divide 398000 by 1700.

$$\begin{array}{r}
 234 \\
 17\cancel{00})\overline{3980\cancel{00}} \\
 \underline{34} \\
 58 \\
 \underline{51} \\
 70 \\
 \underline{68} \\
 200
 \end{array}$$

First cancel the same number of zeros in the dividend and the divisor, and then divide as usual. Annex to the remainder the zeros cancelled in the dividend. The quotient is 234; remainder 200.

Example 2. Divide 598425 by 7300.

$$\begin{array}{r}
 81 \\
 73\cancel{00})\overline{5984\cancel{25}} \\
 \underline{584} \\
 144 \\
 \underline{73} \\
 7125
 \end{array}$$

Cancel all the zeros in the divisor, and the same number of figures in the dividend. Divide as usual, and then annex to the remainder the figures cancelled in the dividend. The quotient is 81; remainder 7125

Notice that only zeros at the end of the divisor can be cancelled in this way. The zeros in 84002 cannot be thus cancelled.

WRITTEN EXERCISES

- | | | |
|-------------------------------|-------------------------------|--------------------------------|
| 1. $840\overline{)124000}$ | 8. $360\overline{)185135}$ | 15. $86000\overline{)2586470}$ |
| 2. $6300\overline{)136427}$ | 9. $970\overline{)70275}$ | 16. $670\overline{)20467}$ |
| 3. $650\overline{)87266}$ | 10. $5700\overline{)218050}$ | 17. $830\overline{)32018}$ |
| 4. $3400\overline{)191408}$ | 11. $2800\overline{)132010}$ | 18. $470\overline{)28208}$ |
| 5. $450\overline{)171567}$ | 12. $5400\overline{)3317220}$ | 19. $5400\overline{)37724}$ |
| 6. $820\overline{)435811}$ | 13. $3400\overline{)1798000}$ | 20. $970\overline{)38890}$ |
| 7. $73000\overline{)4548980}$ | 14. $5300\overline{)217756}$ | 21. $6500\overline{)32770}$ |

ORAL AND WRITTEN EXERCISES

1. Do you live more or less than one mile from your school?
2. Do you know of a place 5 miles from your house? 10 miles? Tell where these places are.
3. How long does it take you to walk a mile? If you walk 3 miles in an hour, how far can you walk in 2 hours? In 3 hours?

Long distances, such as between cities, are measured in miles.

4. If you walk 6 miles in 2 hours, how far do you walk in 1 hour?
5. If an automobile goes 45 miles in 3 hours, how far does it go in 1 hour? In 2 hours?
6. If a train goes from New York to Boston, a distance of 240 miles, in 5 hours, how far does it go in 1 hour? How do you find out?
7. A steamer goes from Chicago to Milwaukee, a distance of 85 miles, in 5 hours. How many miles per hour does it run? How do you find out?
8. A train goes from Albany to New York in 3 hours. How many miles per hour does it run, if the distance is 144 miles? How do you find out?
9. A train goes from San Francisco to Seattle in 32 hours. How many miles per hour does it run if the distance is 960 miles? How do you find out?
10. If you know a distance in miles, and the number of hours required to go that distance, try to give a rule for finding the speed in miles per hour. The preceding problems should help you to find the rule.

WRITTEN EXERCISES

1. If a running horse goes one mile (5280 feet) in one minute and 36 seconds, how many feet per second does he go? (Suggestion: How many seconds are there in 1 minute and 36 seconds?)



2. A man traveled 1056 miles on a motor cycle, the actual time used in traveling being 32 hours. How many miles an hour did he go?



3. A man drove an automobile from New York to Boston, a distance of 270 miles, in 15 hours. What was the average speed?

4. A fast ocean steamer sailed 648 nautical miles in 24 hours. What was its average speed per hour?

5. On its trial trip a cruiser sailed 1363 nautical miles in 47 hours. What was its average speed per hour?



6. A fast freight goes from Chicago to New York in 34 hours. What is the average speed per hour if the distance is 918 miles?

Drill in Fundamentals. Play the game on page 91, using examples in long division.

D

C



A

B

This diagram represents a city block laid out into building lots. The lots are 25 feet wide and 175 feet deep. The alley is 30 feet wide.

WRITTEN EXERCISES

1. How long is this block from A to B?
2. How wide is this block from B to C?
3. If this block is covered completely with flat buildings 3 stories high (3 flats on each lot), how many flats are there in the whole block?
4. If on an average four people live in each flat, how many people live in this block?
5. If you live in a city or town try to find how large the lots are and how many of them there are in a block. Estimate how many people live in a block in your town.

WRITTEN EXERCISES

1. In this figure one inch represents 100 feet. Find the dimensions of each of the four lots. Write down these dimensions for use in the problems on this page.

Lot A
Lot B
Lot C
Lot D

2. How many square feet are there in each of the lots, A, B, C?
3. How many square feet are there in the lot D?

Lots are frequently sold at so much per front-foot. That is, if a lot is 25 feet wide along the street, then at \$100 a front-foot, it would cost $25 \times \$100$, or \$2500.

4. A real-estate man bought these four lots at \$85 a front-foot. How much did they cost him?
5. He sold lot A (corner lot) for \$3000. How much was that per front-foot?
6. He sold lots B and C for \$2750 and \$2625 respectively. How much was that per front-foot for each lot?
7. He sold Lot D for \$3750. How much was that per front-foot?
8. How much did the real-estate man get for all four lots? Did he gain or lose on the whole transaction, and how much?

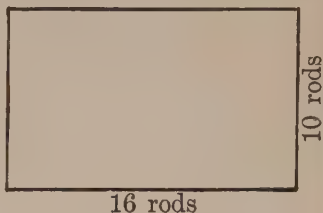
The most valuable land in great cities is often sold by the square foot, while the less valuable land in smaller cities is usually sold at so much a lot.

9. Find how lots are sold in your city, and make problems on buying and selling lots.

In measuring pieces of land, such as farms, the rod and the acre are used as units of measure.

There are 320 rods in one mile.
One rod is $16\frac{1}{2}$ feet, or $5\frac{1}{2}$ yards.

A piece of land 16 rods long and 10 rods wide makes one acre.

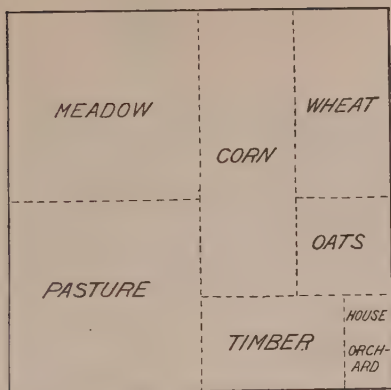


12 inches	= 1 foot
3 feet	= 1 yard
5280 feet	= 1 mile
320 rods	= 1 mile
$16\frac{1}{2}$ feet	= 1 rod
$5\frac{1}{2}$ yards	= 1 rod
1760 yards	= 1 mile
160 square rods	= 1 acre
640 acres	= 1 square mile

ORAL AND WRITTEN EXERCISES

1. How many square rods are there in one acre?
2. How many acres are there in a field 80 rods long and 40 rods wide?
(*Suggestion.* First find the number of square rods in the field, and then divide by 160.)
3. How many acres are there in a field 160 rods long and 80 rods wide?
4. How many acres are there in a field 120 rods long and 60 rods wide?
5. How many square rods are there in a square mile?

Drill in Fundamentals. Play game on page 91, using examples in long division.



WRITTEN EXERCISES

1. This figure represents a farm 160 rods wide and 160 rods long. How many acres are there in this farm?
2. How many rods are represented by one inch in the drawing?
3. How wide and how long is the timber lot? How many acres are there in it?
4. How many acres are there in wheat? In oats?
5. How many acres are used for pasture?
6. How many acres are in corn? In meadow? How many acres are used for the buildings and orchard?
7. Draw a figure representing a field 80 rods long and 40 rods wide, letting one inch represent 20 rods. How many acres are there in this field?
8. Draw a diagram of 1 square mile, letting 8 inches represent one mile. Divide it into several farms and state how large each farm is.

ORAL EXERCISES

1. How can you find the number of square feet in a rectangle?
2. How can you find the number of square yards in a rectangle?
3. How can you find the number of square inches in the top of your desk?
4. If you know the year in which a man was born and the year in which he died, how can you tell his age at the time of his death?
5. If you know the year in which your father was born, how can you tell his age at present?
6. If you know your father's age, how can you tell the year in which he was born?
7. If you know a man's salary and how much he spends, how can you tell how much he saves?
8. If you know how fast a train runs and the number of hours it runs, how can you tell how far it goes?
9. If you know the distance a train has gone and the number of hours it took to go that distance, how do you find its average speed?
10. If you know the speed of a train, how do you find how long it will take to go a certain distance?
11. If you know a distance in feet, and the number of seconds required to go that distance, how do you find the speed? How will this speed be given?
12. If you know the number of acres a farmer plows, and the number of days it takes to plow them, how can you tell how many acres he plows in a day?



The dirt taken out in digging a basement is measured by the *cubic yard*. If you dig a hole 1 yard long, 1 yard wide and 1 yard deep, you take out one cubic yard of dirt. A cubic yard of earth is frequently called a *load*.

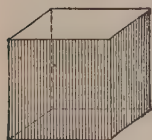
ORAL EXERCISES

1. If you dig a hole 2 yards long, 1 yard wide, and 1 yard deep, how many cubic yards of earth do you take out?
2. How many cubic yards are dug out of a hole 2 yards wide, 3 yards long, and 1 yard deep? How many cubic yards are dug out if the hole is 2 yards deep?
3. How many cubic yards are removed in digging a basement 12 yards long, 10 yards wide, and 2 yards deep? How do you find out?
4. How many cubic yards are removed from a cellar 24 feet (8 yards) long, 18 feet (6 yards) wide, and 6 feet (2 yards) deep?

If you dig a square hole one foot on each side and one foot deep, one *cubic foot* of earth has been removed.

ORAL EXERCISES

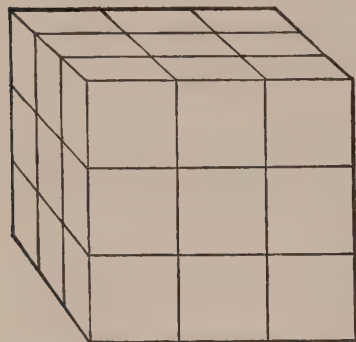
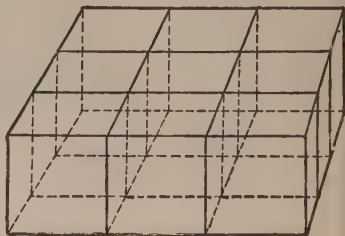
1. How many square feet are there in one square yard?



2. How many cubic feet of earth are removed in digging a hole one yard square and one foot deep?

3. How many cubic feet are removed in digging a hole 3 feet long, 3 feet wide and 3 feet deep?

4. How many cubic feet are there in one cubic yard?



WRITTEN EXERCISES

1. How many cubic feet must be removed in digging a basement 25 feet wide, 35 feet long and 7 feet deep?
How many cubic yards?

Solution: Multiply 35 by 25 and this product by 7 to get the number of cubic feet. Then divide the number of cubic

feet by 27 to get the number of cubic yards. Why?

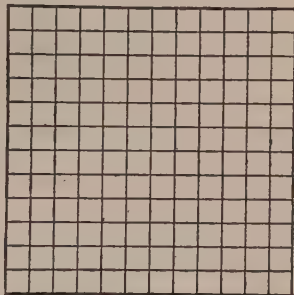
That is, $7 \times 25 \times 35 = 6125$, $6125 \div 27 = 226$, with a remainder 23. Hence, in round numbers, the number of cubic yards is 227.

2. In this way find the number of cubic yards in an excavation 17 feet wide, 28 feet long, and 5 feet deep.

ORAL AND WRITTEN EXERCISES

1. Measure the length, width, and height of your schoolroom. Find each dimension to the nearest foot.
2. How many cubic feet of air does your schoolroom hold?
3. If there are 24 persons in this schoolroom, how many cubic feet of air does the room hold for each person?

4. On the board draw a square foot and divide it into square inches.

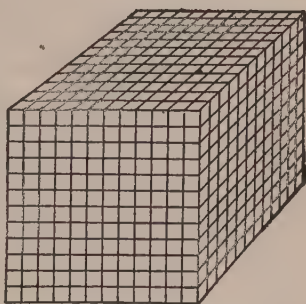


5. How many square inches are there in one square foot?
6. How many inch cubes can be placed in one layer on one square foot?

7. How many inch cubes are required to make two such layers? 3 layers? 4 layers? 12 layers?

8. How many inch cubes make one cubic foot?

9. When you know how many yards long, wide, and deep an excavation is, how do you find how many cubic yards there are in it?



10. When you know how many feet long, wide, and high a schoolroom is, how do you find how many cubic feet of air it contains?
11. When you know how many inches long, wide, and deep a box is, how do you find how many inch cubes the box will hold?



What are the people in the picture doing? What is the ice to be used for? The ice is kept until it is needed by piling it closely in great ice-houses and packing sawdust around it to keep it from thawing. It is hauled to the cities in cars, or floated in barges along canals and rivers.

ORAL AND WRITTEN EXERCISES

1. How many cubic feet of ice are there in a piece 1 foot thick and 1 yard square?
2. How many square yards of ice 1 foot thick must be cut to make one cubic yard?

One cubic foot of ice weighs about 58 pounds.

3. How many pounds does one cubic yard of ice weigh?
4. How much does the weight of 35 cubic feet of ice differ from 2000 pounds, or one ton?

It is usual to allow 40 cubic feet of ice to the ton to allow for waste and looseness of packing.

5. How many tons of ice are there in a pile containing 24360 cubic feet?

WRITTEN EXERCISES

1. A railway car is 37 feet long and 8 feet wide, inside measure. How many cubic feet of ice does it hold if the ice is piled 5 feet deep? How many tons of ice are there in this car if we count 40 cubic feet to the ton?



One *ton* = 2000 pounds.

2. If a city dealer sells ice at 35 cents per hundred pounds, how much does he get for one ton of ice, allowing 200 pounds for waste?
3. A family takes a 10-cent piece of ice each day. How much is their ice bill for the month of September?
4. At an average of 20 pounds of ice to a family; how many families can be served from one ton of ice, allowing 300 pounds for waste?



5. An ice wagon starts out on a very warm day with 3 tons of ice. How many pounds of ice are sold if we allow 1200 pounds for waste?
6. How many families at 40 pounds each can be served from a load of 3 tons, allowing 800 pounds for waste?
7. In a western town a family uses 6000 pounds of ice in a year. How many times does this fill an ice-box which holds 75 pounds?

Drill in Fundamentals. Play the game on page 91, using examples in long division.

To estimate the quotient figures when the divisor is a three-figure number *take quotient of hundreds.*

Example 1. Divide 1987 by 416.

4 Since $19 \div 4 = 4$ with a remainder, we try 4 as the
 416 $\overline{)1987}$ quotient. On multiplying this proves correct.
 1664 Use this method when the second figure of the
 323 divisor is small.

Sometimes this method gives a quotient figure which is too large, as in $6518 \div 834$, when the quotient figure apparently is 8, while the real quotient is 7.

Example 2. Divide 4486 by 684.

6 Since 684 is nearer 700 than 600, and since $44 \div$
 684 $\overline{)4486}$ 7 = 6 with a remainder, we try 6 as the quotient
 4104 figure. On multiplying this proves correct.
 382 Use this method when the second figure of the
 divisor is larger.

Sometimes this method gives a quotient figure which is too small, as in $4426 \div 486$, when the figure apparently is 8, while in reality it is 9.

Great care should be taken to make the first estimate correct, since that saves much time.

ORAL AND WRITTEN EXERCISES

Estimate all the quotients below. Then test to see how many of your estimates are correct.

1. $394 \overline{)1789}$

6. $295 \overline{)1470}$

11. $293 \overline{)2486}$

2. $412 \overline{)3846}$

7. $817 \overline{)7864}$

12. $426 \overline{)3794}$

3. $692 \overline{)4597}$

8. $687 \overline{)5938}$

13. $578 \overline{)5378}$

4. $882 \overline{)7400}$

9. $381 \overline{)2816}$

14. $842 \overline{)6589}$

5. $621 \overline{)4700}$

10. $924 \overline{)7140}$

15. $197 \overline{)1648}$

Example 1. Divide 98964 by 314.

$$\begin{array}{r}
 315 \\
 314 \overline{)98964} \\
 \underline{942} \\
 476 \\
 \underline{314} \\
 1624 \\
 \underline{1570} \\
 54
 \end{array}$$

Hundreds: $989 \div 314 = 3$ with a remainder.

Write 3 in the quotient.

Tens: $476 \div 314 = 1$ with a remainder.

Write 1 in the quotient.

Ones: $1624 \div 314 = 5$ with a remainder.

Write 5 in the quotient.

The quotient is 315, remainder 54.

Example 2. Divide 397864 by 17900.

$$\begin{array}{r}
 22 \\
 17900 \overline{)397864} \\
 \underline{358} \\
 398 \\
 \underline{358} \\
 4064
 \end{array}$$

Cancel as shown in example, then divide as usual. Annex to the remainder the figures cancelled in the dividend.

The quotient is 22, remainder 4064.

WRITTEN EXERCISES

Divide:

1. $498 \overline{)176470}$

10. $489 \overline{)136457}$

19. $374 \overline{)239459}$

2. $347 \overline{)104657}$

11. $823 \overline{)335469}$

20. $7130 \overline{)364504}$

3. $435 \overline{)883546}$

12. $165 \overline{)47832}$

21. $295 \overline{)90987}$

4. $354 \overline{)851807}$

13. $813 \overline{)318700}$

22. $7120 \overline{)150638}$

5. $512 \overline{)63453}$

14. $593 \overline{)194306}$

23. $5640 \overline{)1098340}$

6. $296 \overline{)64508}$

15. $4070 \overline{)325469}$

24. $624 \overline{)317096}$

7. $218 \overline{)110425}$

16. $385 \overline{)1092865}$

25. $31200 \overline{)849200}$

8. $709 \overline{)215959}$

17. $692 \overline{)146753}$

26. $2640 \overline{)178424}$

9. $632 \overline{)128134}$

18. $5070 \overline{)210085}$

27. $3790 \overline{)286538}$

One of the most important things we have to do is to keep in good health. Sometimes it is not so easy to tell whether we are in really good health or not. One of the ways a child can tell is by seeing whether he weighs as much as he should. The tables on the opposite page will help you to do this.

If you are a boy, and between 8 and 9 years old, this table shows that you are likely to be between 42 and 54 inches tall. If you are 8 years old, and 50 inches tall, the table says you should weigh about 59 pounds. If you are 9 years old, and 50 inches tall, the table says you should weigh about 59 pounds.

If you are a girl 9 years old and 49 inches tall you should weigh about 56 pounds.

The teacher will help you to read this table if it causes you trouble. It is important to learn to understand such tables because much valuable information is put into the form of tables.

ORAL EXERCISES

1. What should be your weight according to the table on page 255?
2. Find in this table what should be the weight of a boy 8 years old and 48 inches tall.
3. What should be the weight of a girl 9 years old and 52 inches tall?
4. According to this table, how much should you be gaining each month? How many pounds a year is this?
5. According to this table what should be the total gain in weight of a girl from the time she is 8 years old until she is 12? Of a boy?

The table given below was prepared by Dr. Thomas D. Wood for the Child Health Organization of New York, and is used here by their permission. Weights and measures should be taken without shoes and in only the usual indoor clothes. Boys should remove their coats.

Right Height and Weight for Boys

Height, inches	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.
39	35	36	37	..	..	..	..
40	37	38	39	..	..	..	..
41	39	40	41	..	..	..	..
42	41	42	43	44	..	..	..
43	43	44	45	46	..	..	..
44	45	46	46	47	..	..	..
45	47	47	48	48	49	..	..
46	48	49	50	50	51	..	..
47	..	51	52	52	53	54	..
48	..	53	53	54	55	56	57
49	..	55	56	57	58	58	59
50	..	..	58	59	60	60	61
51	..	..	60	61	62	63	64
52	..	..	62	63	64	65	67
53	..	..	..	66	67	68	69
54	..	..	..	69	70	71	72
55	..	..	..	..	73	74	75
56	..	..	..	..	77	78	79
57	..	..	..	..	..	81	82
58	..	..	..	..	..	84	85

Right Height and Weight for Girls

Height, inches	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.
39	34	35	36	..	..	..	..
40	36	37	38	..	..	..	..
41	38	39	40	..	..	..	..
42	40	41	42	43	..	..	..
43	42	42	43	44	..	..	..
44	44	45	45	46	..	..	..
45	46	47	47	48	49	..	..
46	48	48	49	50	51	..	..
47	..	49	50	51	52	53	..
48	..	51	52	53	54	55	..
49	..	53	54	55	56	57	58
50	..	..	56	58	59	60	61
51	..	..	59	60	61	62	63
52	..	..	62	63	64	65	66
53	..	..	..	66	67	68	68
54	..	..	..	68	69	70	71
55	..	..	..	..	72	73	74
56	..	..	..	..	76	77	78
57	..	..	..	..	..	81	82
58	..	..	..	..	..	85	86
59	..	..	..	..	..	89	90

About What a Boy Should Gain Each Month

Age	
5 to 8	6 oz.
8 to 12	8 oz.
12 to 16	16 oz.
16 to 18	8 oz.

About What a Girl Should Gain Each Month

Age	
5 to 8	6 oz.
8 to 11	8 oz.
11 to 14	12 oz.
14 to 16	8 oz.
16 to 18	4 oz.

WRITTEN EXERCISES

Perform each of the multiplications indicated. Check your results by multiplying the lower by the upper number.

$$\begin{array}{r} 1. \ 819 \\ \underline{746} \end{array}$$

$$\begin{array}{r} 6. \ 687 \\ \underline{493} \end{array}$$

$$\begin{array}{r} 11. \ 978 \\ \underline{643} \end{array}$$

$$\begin{array}{r} 16. \ 698 \\ \underline{570} \end{array}$$

$$\begin{array}{r} 2. \ 827 \\ \underline{509} \end{array}$$

$$\begin{array}{r} 7. \ 749 \\ \underline{568} \end{array}$$

$$\begin{array}{r} 12. \ 789 \\ \underline{590} \end{array}$$

$$\begin{array}{r} 17. \ 597 \\ \underline{409} \end{array}$$

$$\begin{array}{r} 3. \ 921 \\ \underline{468} \end{array}$$

$$\begin{array}{r} 8. \ 890 \\ \underline{569} \end{array}$$

$$\begin{array}{r} 13. \ 409 \\ \underline{821} \end{array}$$

$$\begin{array}{r} 18. \ 804 \\ \underline{260} \end{array}$$

$$\begin{array}{r} 4. \ 983 \\ \underline{640} \end{array}$$

$$\begin{array}{r} 9. \ 538 \\ \underline{691} \end{array}$$

$$\begin{array}{r} 14. \ 857 \\ \underline{746} \end{array}$$

$$\begin{array}{r} 19. \ 934 \\ \underline{876} \end{array}$$

$$\begin{array}{r} 5. \ 789 \\ \underline{605} \end{array}$$

$$\begin{array}{r} 10. \ 769 \\ \underline{835} \end{array}$$

$$\begin{array}{r} 15. \ 794 \\ \underline{683} \end{array}$$

$$\begin{array}{r} 20. \ 519 \\ \underline{872} \end{array}$$

Perform the divisions indicated below. How can you check the results? Check each one.

$$21. \ 346 \overline{)519764}$$

$$26. \ 418 \overline{)673495}$$

$$31. \ 572 \overline{)731089}$$

$$22. \ 478 \overline{)734861}$$

$$27. \ 573 \overline{)740067}$$

$$32. \ 684 \overline{)801056}$$

$$23. \ 659 \overline{)781096}$$

$$28. \ 705 \overline{)803459}$$

$$33. \ 784 \overline{)918057}$$

$$24. \ 354 \overline{)1456089}$$

$$29. \ 436 \overline{)1497080}$$

$$34. \ 513 \overline{)2309816}$$

$$25. \ 640 \overline{)3094061}$$

$$30. \ 783 \overline{)2904067}$$

$$35. \ 697 \overline{)5325681}$$

Drill in Fundamentals. Run a cross-country race as described on page 91, using examples in multiplication.

The next day run such a race, using examples in long division. Use the same teams for both races. The team which has the lowest score for the two races wins.

ORAL AND WRITTEN EXERCISES

1. How many seconds are there in one minute? In one hour?
2. How many minutes are there in one hour? In a day of 24 hours?
3. If a man works 8 hours a day, how many hours does he work in one year of 300 working days?
4. If a man works 10 hours a day, how many more hours does he work in a year of 300 working days than a man who works 8 hours a day?
5. If a school is in session from 9 o'clock to 12, and from 1.30 to 3.30, how many hours is this school in session each day?
6. A school is in session 5 hours each day for 190 days. How many hours is this?
7. If a half-hour is given each day to arithmetic, how many hours are given to arithmetic in 190 days?
8. A clock strikes once at 1 o'clock, twice at 2, and so on. How many times does it strike from 1 o'clock to 12 o'clock, not counting the half-hour strokes? How many times does this clock strike in a day of 24 hours?
9. How many half-hour strokes does a clock strike in one day of 24 hours? How many strokes does a clock strike in 24 hours, counting the half-hour strokes?
10. How many times does a clock strike in one year of 365 days, if it strikes 156 times each day?
11. How many times does a clock strike in a year of 365 days if it strikes 180 times each day?

1			
$\frac{1}{2}$		$\frac{1}{2}$	
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

ORAL EXERCISES

1. How many halves are there in 1? How many 4ths are there in 1?
2. How many 4ths are there in $\frac{1}{2}$?

We write this $\frac{1}{2} = \frac{2}{4}$.

3. Draw a figure to show how many 8ths there are in 1.
4. Draw a figure to show how many 8ths there are in $\frac{1}{4}$.

We write this $\frac{1}{4} = \frac{2}{8}$.

5. In a fraction what is the number above the line called? What is the number below the line called? What is the numerator and what is the denominator of $\frac{2}{4}$?

In the fraction $\frac{2}{4}$ the 4 tells into how many parts the figure has been divided, and the 2 tells how many of these parts are taken.

6. Tell a similar story for each of the fractions $\frac{1}{2}$, $\frac{3}{6}$, $\frac{4}{8}$.

In examples 3 and 4 above we see that if the denominator of one of the fractions $\frac{1}{2}$, $\frac{1}{4}$ is doubled the numerator must also be doubled if the value of the fraction is to remain the same. This is true for all fractions.

7. Read the following and supply the missing numbers:

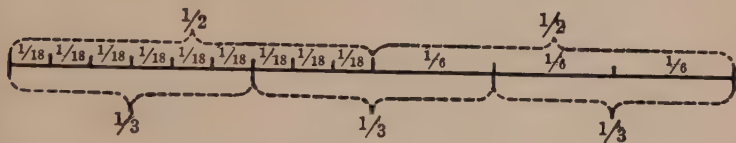
$$\frac{1}{3} = ?/6 \quad \frac{1}{6} = ?/12 \quad \frac{3}{5} = ?/10 \quad \frac{1}{5} = ?/10$$

$$\frac{1}{2} = ?/4 \quad \frac{2}{3} = ?/6 \quad \frac{1}{7} = ?/14 \quad \frac{4}{5} = ?/10$$

$$\frac{2}{5} = ?/10 \quad \frac{3}{4} = ?/8 \quad \frac{1}{4} = ?/8 \quad \frac{2}{7} = ?/14$$

ORAL EXERCISES

1. In the figure point out $\frac{1}{2}$ of the whole line. How many 6ths are there in $\frac{1}{2}$?



$$\frac{1}{2} = \frac{3}{6} = \frac{9}{18}$$

$$\frac{1}{6} = \frac{3}{18}$$

2. In the figure point out $\frac{1}{18}$ of the whole line. How many 18ths are there in $\frac{1}{2}$?

In the above examples we see that if the denominator of one of the fractions $\frac{1}{2}$, $\frac{1}{6}$, $\frac{3}{6}$ is multiplied by 3, the numerator must also be multiplied by 3 if the value of the fraction is to remain unchanged. This is true for all fractions.

3. Change $\frac{1}{3}$ into two different fractions. Draw a figure for each change.
4. Change $\frac{2}{3}$ into two different fractions. Can you change $\frac{3}{3}$ into 12ths?
5. Change $\frac{1}{5}$ into two different fractions. Can you change $\frac{1}{5}$ into 10ths? Into 12ths?
6. Draw a figure to show that $\frac{1}{2} = \frac{4}{8}$.
7. Draw a figure to show that $\frac{1}{3} = \frac{4}{12}$.
8. Draw a figure to show how many 12ths there are in $\frac{1}{3}$.

The following is true for all fractions: If the denominator of a fraction is multiplied by 4, the numerator must also be multiplied by 4 to keep the value of the fraction unchanged.

9. Change each of the following into three different fractions:
 $\frac{2}{3}$, $\frac{4}{5}$, $\frac{5}{6}$, $\frac{5}{8}$.

The Terms of a Fraction. The numerator and the denominator of a fraction are called the *terms* of the fraction.

We have seen on the preceding pages that both terms of a fraction may be multiplied by 2, 3 or 4, without changing the value of the fraction.

If both terms of a fraction may be multiplied by 2, it follows that they may also be divided by 2. Thus, $\frac{2}{4} = \frac{1}{2}$, because $\frac{1}{2} = \frac{2}{4}$. Similarly, $\frac{4}{8} = \frac{2}{4} = \frac{1}{2}$, $\frac{6}{8} = \frac{3}{4}$, and $\frac{4}{6} = \frac{2}{3}$.

Fractions in the Simplest Form. If both terms of a fraction cannot be divided without a remainder by the same whole number, except 1, then the fraction is said to be in the *simplest form*. Thus, $\frac{1}{2}$, $\frac{2}{3}$ and $\frac{3}{4}$ are in the simplest form, while $\frac{2}{4}$ and $\frac{3}{6}$ are not in the simplest form.

ORAL EXERCISES

1. In which of the fractions can both terms be divided exactly by 2: $\frac{1}{2}$, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{5}$, $\frac{4}{10}$, $\frac{4}{6}$, $\frac{6}{10}$, $\frac{6}{7}$, $\frac{6}{8}$, $\frac{2}{12}$?
2. Which of the fractions in Example 1 are in the simplest form? Reduce the others to the simplest form by dividing both terms by 2.

From $\frac{1}{2} = \frac{3}{6}$, it follows that $\frac{3}{6} = \frac{1}{2}$.

3. In $\frac{3}{6} = \frac{1}{2}$, both terms of the fraction $\frac{3}{6}$ have been divided by what number?
4. In which of the following fractions may both terms be divided by 3: $\frac{2}{5}$, $\frac{3}{6}$, $\frac{5}{9}$, $\frac{6}{9}$, $\frac{3}{9}$, $\frac{3}{15}$, $\frac{3}{16}$, $\frac{6}{15}$?

Which fractions in this list are in the simplest form? Reduce the others to the simplest form.

5. Which fractions in the following list are in the simplest form: $\frac{3}{8}$, $\frac{3}{6}$, $\frac{2}{6}$, $\frac{5}{6}$, $\frac{3}{9}$, $\frac{4}{10}$, $\frac{3}{12}$, $\frac{4}{12}$, $\frac{4}{8}$. Reduce the others to the simplest form.

Example 1. Divide 49 by 8. This gives a quotient 6 and a remainder 1. The remainder is a part of the dividend which has not yet been divided. If 1 is divided by 8, we get $\frac{1}{8}$, as there are eight $\frac{1}{8}$'s in 1.

Hence, we write $49 \div 8 = 6\frac{1}{8}$, with no remainder.

Example 2. Divide 129 by 6. The quotient is 21, and the remainder is 3. The remainder divided by 6 gives

$$\begin{array}{r} 21\frac{3}{6}, \text{ or } 21\frac{1}{2} \\ 6 \overline{)129} \end{array} \qquad \frac{3}{6}, \text{ or } \frac{1}{2}. \text{ Hence, the quotient is } 21\frac{1}{2}.$$

Notice that $\frac{3}{6}$ is reduced to the simplest form by dividing both terms by 3.

WRITTEN EXERCISES

In this manner divide each of the following. Express each fraction in the simplest form. Thus, if you get $\frac{3}{6}$ write it $\frac{1}{2}$, if you get $\frac{6}{8}$ write it $\frac{3}{4}$, and so on:

- | | | | |
|------------------|--------------|--------------|--------------|
| 1. $487 \div 5$ | $573 \div 6$ | $654 \div 7$ | $845 \div 8$ |
| 2. $749 \div 6$ | $695 \div 7$ | $819 \div 9$ | $763 \div 9$ |
| 3. $729 \div 8$ | $798 \div 2$ | $689 \div 7$ | $879 \div 2$ |
| 4. $827 \div 7$ | $631 \div 5$ | $492 \div 6$ | $746 \div 3$ |
| 5. $827 \div 3$ | $742 \div 4$ | $873 \div 5$ | $932 \div 7$ |
| 6. $596 \div 5$ | $985 \div 9$ | $586 \div 6$ | $791 \div 8$ |
| 7. $749 \div 7$ | $915 \div 8$ | $573 \div 7$ | $817 \div 8$ |
| 8. $693 \div 8$ | $798 \div 9$ | $897 \div 9$ | $689 \div 7$ |
| 9. $395 \div 9$ | $897 \div 7$ | $794 \div 8$ | $647 \div 8$ |
| 10. $539 \div 6$ | $697 \div 6$ | $987 \div 5$ | $951 \div 9$ |
| 11. $847 \div 7$ | $276 \div 4$ | $374 \div 5$ | $487 \div 7$ |
| 12. $519 \div 8$ | $941 \div 6$ | $212 \div 7$ | $692 \div 8$ |

Drill in Fundamentals. Play game on page 91, using examples in long division.

ORAL EXERCISES

Give the sums of the following:

- | | | | |
|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 1. $\frac{1}{3} + \frac{1}{3}$ | 4. $\frac{1}{5} + \frac{3}{5}$ | 7. $\frac{1}{8} + \frac{5}{8}$ | 10. $\frac{1}{6} + \frac{5}{6}$ |
| 2. $\frac{1}{4} + \frac{1}{4}$ | 5. $\frac{2}{5} + \frac{2}{5}$ | 8. $\frac{3}{8} + \frac{5}{8}$ | 11. $\frac{1}{7} + \frac{2}{7}$ |
| 3. $\frac{1}{5} + \frac{2}{5}$ | 6. $\frac{1}{8} + \frac{3}{8}$ | 9. $\frac{1}{8} + \frac{7}{8}$ | 12. $\frac{3}{7} + \frac{2}{7}$ |

Example 1. Add $\frac{1}{2}$ and $\frac{1}{4}$.

$$\begin{aligned} \frac{1}{2} &= \frac{2}{4} && \text{We must first change } \frac{1}{2} \text{ into 4ths. That is, } \frac{1}{2} + \frac{1}{4} \\ \frac{1}{4} &= \frac{1}{4} && = \frac{2}{4} + \frac{1}{4} = \frac{3}{4}. \\ \hline &&& \frac{3}{4}, \text{ sum.} \end{aligned}$$

WRITTEN EXERCISES

In this way add the following:

- | | | | |
|--------------------------------|--------------------------------|--------------------------------|----------------------------------|
| 1. $\frac{1}{3} + \frac{1}{6}$ | 4. $\frac{1}{4} + \frac{1}{8}$ | 7. $\frac{1}{2} + \frac{1}{6}$ | 10. $\frac{1}{3} + \frac{4}{9}$ |
| 2. $\frac{1}{2} + \frac{1}{8}$ | 5. $\frac{1}{4} + \frac{3}{8}$ | 8. $\frac{1}{3} + \frac{1}{9}$ | 11. $\frac{1}{8} + \frac{1}{16}$ |
| 3. $\frac{1}{2} + \frac{3}{8}$ | 6. $\frac{1}{4} + \frac{5}{8}$ | 9. $\frac{2}{3} + \frac{1}{9}$ | 12. $\frac{3}{8} + \frac{3}{16}$ |

Example 2. Subtract $\frac{1}{6}$ from $\frac{1}{2}$.

$$\begin{aligned} \frac{1}{2} &= \frac{3}{6} && \text{We must first change } \frac{1}{2} \text{ to 6ths. That is, } \frac{1}{2} - \frac{1}{6} = \\ \frac{1}{6} &= \frac{1}{6} && \frac{3}{6} - \frac{1}{6} = \frac{2}{6} = \frac{1}{3}. \\ &&& \frac{2}{6} = \frac{1}{3}, \text{ remainder.} \end{aligned}$$

ORAL AND WRITTEN EXERCISES

In this manner find the differences in the following. See how many you can solve without using pencil and paper:

- | | | | |
|--------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 1. $\frac{1}{2} - \frac{1}{4}$ | 7. $\frac{1}{2} - \frac{1}{6}$ | 13. $\frac{1}{3} - \frac{2}{9}$ | 19. $\frac{1}{4} - \frac{1}{16}$ |
| 2. $\frac{3}{4} - \frac{1}{2}$ | 8. $\frac{1}{2} - \frac{1}{8}$ | 14. $\frac{4}{9} - \frac{1}{3}$ | 20. $\frac{3}{4} - \frac{3}{8}$ |
| 3. $\frac{3}{8} - \frac{1}{4}$ | 9. $\frac{3}{4} - \frac{1}{8}$ | 15. $\frac{5}{9} - \frac{1}{3}$ | 21. $\frac{3}{4} - \frac{5}{8}$ |
| 4. $\frac{5}{8} - \frac{1}{4}$ | 10. $\frac{1}{3} - \frac{1}{9}$ | 16. $\frac{1}{6} - \frac{1}{12}$ | 22. $\frac{3}{4} - \frac{3}{16}$ |
| 5. $\frac{5}{8} - \frac{1}{2}$ | 11. $\frac{2}{3} - \frac{4}{9}$ | 17. $\frac{1}{5} - \frac{1}{10}$ | 23. $\frac{3}{4} - \frac{7}{16}$ |
| 6. $\frac{7}{8} - \frac{3}{4}$ | 12. $\frac{1}{4} - \frac{1}{16}$ | 18. $\frac{1}{4} - \frac{3}{16}$ | 24. $\frac{3}{4} - \frac{9}{16}$ |

Since $\frac{1}{5} + \frac{1}{5} = \frac{2}{5}$, we know that $2 \times \frac{1}{5} = \frac{2}{5}$.

Also, since $\frac{2}{7} + \frac{2}{7} = \frac{4}{7}$, we know that $2 \times \frac{2}{7} = \frac{4}{7}$.

That is, to multiply $\frac{1}{5}$ or $\frac{2}{7}$ by 2, multiply the numerator by 2 and leave the denominator unchanged.

ORAL EXERCISES

Give products in the following:

- | | | | |
|---------------------------|----------------------------|----------------------------|-----------------------------|
| 1. $2 \times \frac{3}{7}$ | 4. $3 \times \frac{1}{8}$ | 7. $5 \times \frac{1}{8}$ | 10. $4 \times \frac{1}{9}$ |
| 2. $2 \times \frac{2}{5}$ | 5. $3 \times \frac{3}{16}$ | 8. $5 \times \frac{1}{16}$ | 11. $4 \times \frac{2}{9}$ |
| 3. $3 \times \frac{1}{4}$ | 6. $3 \times \frac{5}{16}$ | 9. $5 \times \frac{3}{16}$ | 12. $7 \times \frac{1}{16}$ |

From these examples we get the rule:

To multiply a fraction by a whole number, multiply the numerator by the whole number and leave the denominator unchanged.

Fractions found in this way may need to be made simpler by the method shown on page 260. This is shown in the following example:

Example. Multiply $\frac{3}{16}$ by 4.

$4 \times \frac{3}{16} = \frac{12}{16} = \frac{3}{4}$. In this case both terms of the fraction $\frac{12}{16}$ are divided by 4.

WRITTEN EXERCISES

Multiply and reduce each result to the simplest form.

- | | | | |
|----------------------------|----------------------------|----------------------------|------------------------------|
| 1. $3 \times \frac{2}{9}$ | 4. $4 \times \frac{1}{10}$ | 7. $4 \times \frac{5}{32}$ | 10. $8 \times \frac{3}{32}$ |
| 2. $2 \times \frac{3}{8}$ | 5. $6 \times \frac{1}{16}$ | 8. $8 \times \frac{1}{12}$ | 11. $10 \times \frac{3}{32}$ |
| 3. $5 \times \frac{2}{15}$ | 6. $4 \times \frac{3}{14}$ | 9. $7 \times \frac{1}{14}$ | 12. $9 \times \frac{1}{21}$ |

In the fifth grade, when we study fractions more fully, we shall work such examples a little differently.

WRITTEN EXERCISES

1. James bought 19 chicks at 17 cents apiece. How much did he pay for the chicks?



2. During the summer James bought grain 12 times for his chickens, and paid 75 cents each time. How much did he pay for grain?
3. In the fall James sold 6 chickens whose total weight was 27 pounds. What was their average weight?
4. What did James receive for the 27 pounds of chickens at 22 cents a pound?
5. One month in the winter James got 36 eggs each week from 9 hens. How many eggs a week did these hens average?
6. How much did James receive for his 36 eggs at 60 cents a dozen?
7. One month in the summer James sold 17 dozen eggs at 35 cents a dozen. How much money did he receive?
8. During the year James paid \$3.23 for little chicks, \$6.50 for chicken-house and run, \$9.00 for feed. How much did his chickens cost him altogether?
9. During this time he sold chickens for \$6.85, and eggs for \$19.25. He estimates the value of his stock and equipment at \$15.00. What is the sum of all these?
10. If any member of your class is raising chickens get him to make problems like these for the class to solve. The rest of the class may also make such problems.

ORAL EXERCISES

1. If you know the length, width, and depth in feet of an excavation, how do you find how many cubic feet are excavated?
2. If you know the number of cubic feet in a schoolroom, and also the number of children there are in the room, how can you tell how many cubic feet of air the room holds for each child?
3. If you know how many cubic feet there are in an excavation, how can you tell how many cubic yards there are in it?
4. If you know how many square feet there are in a floor, how do you find how many square yards there are in it?
5. If both terms of a fraction are multiplied by the same number, what is the effect on the value of the fraction?
6. If both terms of a fraction are divided by the same number, what is the effect on the value of the fraction? Show 5 and 6 by examples.
7. If you know how many years old a man is, how can you find how many days old he is?
8. If you know the length, width, and depth of a pile of ice, how can you tell how many tons there are in it? (See Example 1, page 251.)
9. If you know how many rods long and how many rods wide a field is, how can you tell how many acres there are in it?
10. If you know the number of front feet in a lot and the price per front-foot, how can you find the price of the lot?

ORAL AND WRITTEN EXERCISES

1. How much does it cost to send letters between any two places in the United States? Can you find out to what other countries we can send letters at the same rate?



2. How much does it cost to send an open circular letter? What is the price of a postcard?

3. One day a business house sent out 2848 letters, 580 open circulars, and 3500 postcards. What was the

total cost of the postage?

4. One day a certain post-office sold 2-cent stamps for \$284.60. How many letters could be sent for this postage?

5. If the average letter weighs one-half ounce, how many such letters are there in one pound? In one ton?



6. Sending newspapers and periodicals by mail costs 1 cent a pound. How much does it cost to send one ton of periodicals by mail?
7. See if you can find out how much it costs to mail one copy of your daily paper. Also try to find out how much it costs to mail a copy of a magazine taken in your home.
8. Make other problems on using the mails. Find the rates of postage during the war, and make problems, using these rates.

DRILL IN ADDITION, MULTIPLICATION, DIVISION 267

WRITTEN EXERCISES

Add:

1. 4648	2. 5324	3. 7809	4. 4807
291	6017	125	5217
7826	518	673	532
6400	305	1092	7631
628	4007	5630	719
7145	9732	875	2016
356	4385	6407	3508
2892	7219	2519	9173
1378	507	541	816
<u>1982</u>	<u>1072</u>	<u>7163</u>	<u>5438</u>

Multiply:

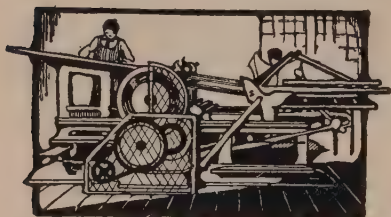
5. 8364	6. 5902	7. 1508	8. 6543
<u>87</u>	<u>136</u>	<u>314</u>	<u>217</u>
9. 732	10. 6314	11. 2907	12. 7805
<u>47</u>	<u>231</u>	<u>399</u>	<u>217</u>
13. 4823	14. 5629	15. 2007	16. 6351
<u>56</u>	<u>427</u>	<u>456</u>	<u>207</u>
17. 8902	18. 2137	19. 5432	20. 8537
<u>176</u>	<u>164</u>	<u>349</u>	<u>846</u>

Divide:

21. $88 \overline{)18735}$	22. $256 \overline{)153897}$	23. $72 \overline{)13963}$
24. $39 \overline{)80652}$	25. $469 \overline{)56389}$	26. $289 \overline{)59347}$
27. $48 \overline{)10564}$	28. $508 \overline{)120064}$	29. $195 \overline{)12243}$
30. $480 \overline{)9670}$	31. $2980 \overline{)164320}$	32. $619 \overline{)54180}$

WRITTEN EXERCISES

1. During the month of April Harry Forbes sold copies of the *Saturday Evening Post* as follows: 56 the first week, 67 the second, 53 the third, and 81 the fourth.



How many *Posts* did he sell in all? He paid three cents apiece for the *Post*, and sold them for 5 cents. How much did he make selling *Posts* in April?

(Unsold copies of the *Post* may be returned.)

Harry has a regular list of customers at whose houses he delivers papers each afternoon. He buys the papers from the publishers, and collects once a month from his customers.

2. During April Harry delivered papers as follows: the first week an average of 84 a day for six days, the second week an average of 87 a day, the third week



an average of 86 a day, the fourth week an average of 88 a day, and the remaining two days of the month 89 copies each day. How many afternoon papers did he sell in April?



3. Harry bought morning papers at \$1.40 a hundred and sold them at 2 cents apiece. How much did he make by selling 500 papers?

4. He bought Sunday papers at $3\frac{1}{2}$ cents apiece (\$3.50 a hundred) and sold them at 5 cents apiece. From these facts make some problems on selling Sunday papers.

5. Make some problems on selling evening papers.

WRITTEN EXERCISES

Play store. Make out sales checks for these purchases and find out how much change you should get in each case. Appoint one or two pupils auditors to see that your work is right. For form of sales check see page 199.

1. $\frac{1}{2}$ lb. steak.....	\$.18	2. 5 lbs. sugar.....	\$.27
$\frac{1}{2}$ lb. sausage.....	.12	3 packages break-	
1 lb. bacon.....	.20	fast food.....	.45
Amt. recd.....	\$1.00	1 doz. eggs.....	.28
		2 lbs. butter.....	.70
		Amt. recd.....	\$5.00
3. $\frac{1}{2}$ doz. teaspoons	\$3.25	4. 1 boy's suit.....	\$2.19
$\frac{1}{2}$ doz. plated		1 boy's cap.....	.19
spoons.....	2.49	1 boy's spring	
1 cream ladle....	1.69	coat.....	2.49
1 salad set.....	3.98	1 pr. boy's shoes	1.75
Amt. recd.....	\$12.00	Amt. recd.....	\$7.00
5. 1 girl's hat.....	\$1.38	6. 1 soap dish.....	\$1.19
1 girl's dress.....	4.39	2 towel bars at	
1 umbrella.....	1.89	58¢ apiece....	1.16
1 pr. gloves.....	1.87	1 brush holder..	.21
Amt. recd.....	\$10.00	1 tumbler holder.	.20
		Amt. recd.....	\$5.00
7. 1 brush.....	\$0.79	8. 1 pr. shoes.....	\$3.50
Notions.....	.11	1 pr. rubbers....	.85
Comb.....	.35	1 pr. slippers....	1.89
Buckle.....	.29	1 pr. low shoes..	4.50
Amt. recd.....	\$2.00	Amt. recd....	\$15.00

Drill in Fundamentals. Play the game on page 195, using examples in multiplication for the first event, and examples in long division for the second event.

Prices of meat per pound:

Sirloin.....	30¢	Chuck roast.....	20¢
Round steak.....	28¢	Pork chops.....	32¢
Rib roast.....	24¢	Bacon.....	38¢

(16 ounces = 1 pound)

In selling meat the butcher cuts off pieces which he estimates equal to the amount asked for by the customer. Often the weight of the piece cut off is one or two ounces above or below the amount desired. The price is then figured to the nearest cent.

WRITTEN EXERCISES

At the prices given on this page, what will be the cost of the following meat purchases? Give as many as you can without using pencil and paper.

1. 18 ounces of sirloin.

Solution: 16 ounces, or 1 pound, costs 30 cents. 2 ounces is $\frac{2}{16}$ or $\frac{1}{8}$ of a pound. $\frac{1}{8}$ of 30¢ is nearly 4¢. So the total cost is 30¢ plus 4¢, or 34¢.

2. 20 ounces of round steak.
3. $4\frac{3}{4}$ pounds of rib roast.
4. $3\frac{1}{4}$ pounds of chuck roast.
5. 22 ounces of pork chops.
6. 26 ounces of bacon.
7. $2\frac{1}{2}$ pounds of pork chops.
8. 1 pound 6 ounces of bacon.
9. 24 ounces of round steak.
10. 36 ounces of sirloin.
11. 5 pounds 10 ounces of rib roast.

ORAL AND WRITTEN EXERCISES

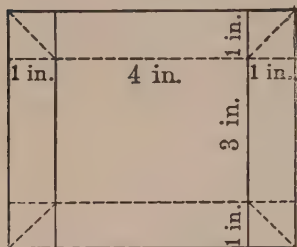
- Find the net price of each article.

- | | | | |
|---|----------------|-------------------------------------|----------------|
| 5. Find the net amount of each of the following bills: | | | |
| 6 dining chairs..... | \$27.00 | 1 suit..... | \$28.00 |
| 1 parlor chair..... | 9.50 | 1 overcoat..... | 32.00 |
| 1 parlor chair..... | 12.00 | 2 pr. shoes..... | 9.50 |
| 1 rug..... | 54.00 | 1 hat..... | 4.00 |
| 1 rug..... | 42.00 | 1 umbrella..... | 3.50 |
| 1 sideboard..... | 60.00 | 6 pr. sox..... | 3.00 |
| 1 leather couch..... | 60.00 | 4 ties..... | 3.00 |
| 3 bedroom chairs... | 10.50 | 3 suits underwear.. | 5.00 |
| $\frac{1}{5}$ off | | $\frac{1}{4}$ off | |

To find the net amount of each of these bills, add to see how much it amounts to before taking off the discount. Then find the discount and subtract it.

ORAL EXERCISES

1. Take a sheet of paper and ask your teacher to show you how to fold it to make a box. She will show you how to fasten the corners. Try to make a cover for the box.
2. How long is your sheet of paper? How long is the box?



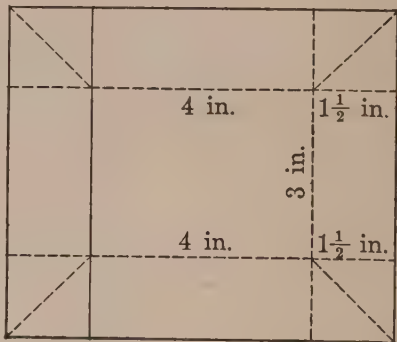
3. How long and how wide a sheet do you need to make a box 4 inches long, 4 inches wide and 2 inches deep? Measure the sheet, then make the box to see how long it is.

4. Take a sheet of paper 6 inches long and 5 inches wide. Fold

it to make a box 4 inches long and 3 inches wide. How deep is it?

5. Make a box 6 inches long, 4 inches wide and 2 inches deep. How large a sheet do you need for this box?

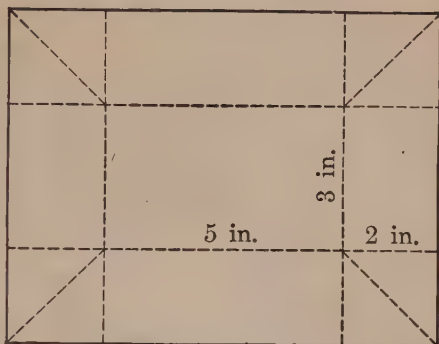
6. What are the dimensions of the paper shown in this figure? What are the dimensions of the box to be made from it? How many cubic inches will it hold?



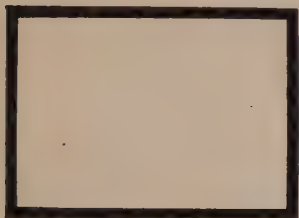
7. What is the length of ribbon required to tie a box 6'' by 4'' by 3'' as shown in the figure, allowing 8 inches for tying?

ORAL AND WRITTEN EXERCISES

1. What are the dimensions of the box which may be made by folding the paper represented in the figure? What are the dimensions of the paper before it is folded?

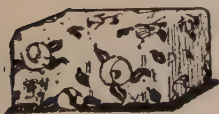


2. A girl is binding a picture $8\frac{1}{2}$ " long and $6\frac{1}{4}$ " wide with passe-partout paper. How many inches of the paper does she need?



3. Some girls are hemstitching napkins 18" by 18". How many yards of hemstitching are there in each napkin?

4. Make a sewing box 6 inches long, 4 inches wide, and 3 inches deep. How many square inches are there in the top and bottom? In the two sides? In the two ends? How many square inches of silk will it take to cover the whole box?



5. A picture frame 18" by 14" outside measure, and with an opening 14" by 10", is to be covered with gold leaf. How many square inches of gold leaf are needed?



A grammar school building has just been built, and the new furniture is about to be bought.

WRITTEN EXERCISES

1. There are 8 rooms with 36 seats in each, and 12 rooms with 42 seats in each. How many pupils will the building seat altogether?
2. How many dozen desks will be needed for the building? How much will they cost at \$54.00 a dozen?
3. Twenty teachers' desks are bought at \$12.50 each. How much do these cost?
4. What is the cost of 22 revolving chairs at \$6.50 apiece?
5. How much do 30 chairs cost at \$1.50 apiece?
6. An office desk for the principal costs \$40.00, a filing cabinet costs \$85.00, and a typewriter \$65.00. What is the price of all of these?
7. Five rooms are fitted out with map cases at \$48.00 each. How much do these cost?
8. Globes are bought for \$120, charts for \$150, books for \$320, and other articles for \$280. How much do all these cost?
9. Make problems about furnishing a school building, and solve them. Try to find the actual cost of various items of furniture in your school, such as desks, maps, chairs, etc.

1. In a school 135 tons of coal, costing \$6.75 a ton, are used during the year. How much does the coal cost?
2. In a town there are 418 children in the elementary schools. What is the cost of providing schooling for each child if the city spends \$16720 each year on these schools?
3. In a private school the children pay \$75 for tuition each year. At this rate, how much would the 418 children of example 2 pay?
4. In one town \$125,400 is spent each year to maintain the public schools. How much per day is this, if the schools are open 190 days in the year?
5. In a town it is found that it costs on an average \$275 per day to run the schools. How much per year is this if the schools run 200 days per year?
6. A gymnasium costing \$9675 is added to a school building with 215 pupils. How much per pupil does the gymnasium cost?
7. In a large city a school building was built and equipped at a cost of \$274,000. What was the cost per pupil if there were 1370 pupils in the building?
8. For one school 140 primary arithmetics are bought for 33¢ (\$.33) apiece, 90 intermediate arithmetics for 36¢ (\$.36) apiece, and 70 advanced arithmetics at 45¢ (\$.45) apiece. How much do all these books cost?
9. Try to find how much it costs to supply your school with new arithmetics.
10. Try to find how many children there are in the schools in your city or district, and also how much is spent yearly on these schools. How much is this per child?



What different materials have you seen used for sidewalks? Concrete walks are laid at so much per square yard.

WRITTEN EXERCISES

1. A man has a lot fronting 60 feet on the street. How much will it cost him to lay a concrete walk 6 feet wide in front of this lot at \$1.40 a square yard?
2. A board sidewalk costs \$1.10 per square yard. How much does a boardwalk 6 feet wide and 240 feet long cost?
3. At \$1.55 per square yard, what is the cost of a walk 6 feet wide and 360 feet long?
4. A man had to build a sidewalk 6 feet wide and 75 feet long. Instead of letting this work on contract he decided to buy his own material and hire the work done by the day. Material cost him: cement \$5.80, crushed stone \$8.00, sand \$4.50. He hired one team 4 days at \$4.25 a day, and another $2\frac{1}{2}$ days at \$4.00 a day. He also hired 3 men $1\frac{1}{2}$ days at \$2.25 a day to put down the walk. What was the total cost of the walk? What was the cost per square yard?

Drill in Fundamentals. Play the game on page 195, using examples in addition for the first event, examples in subtraction for the second, examples in multiplication for the third, and examples in division for the fourth event.

ORAL EXERCISES

1. How can you find how much it costs to send a certain number of letters by mail? How do you find how much it costs to send a certain number of postcards.
2. How can you find out how much it costs to send a certain number of pounds of periodicals by mail?
3. If you know how much a boy paid for newspapers, and how much he sold them for, how can you tell how much he made by selling them?
4. If you know how much money a man had when he went into a store, and also how much he had when he came out, how can you tell how much he spent in the store?
5. If you know how many chairs are needed for a large hall, and the cost per dozen, how do you find the total cost of the chairs?
6. If you know how much it costs to run a school, and also the number of children there are in the school, how can you tell how much it costs to provide schooling for each child?
7. If you know the price at which goods are marked in a store, and also the discount allowed, how do you find the net price?
8. If you know the dimensions of a sidewalk in feet, how do you find the number of square yards in it?
9. Tell fully how you could find how many cubic feet of air for each pupil your schoolroom holds?
10. If you know how many pupils there are in a school, and also how many teachers, how can you find how many pupils there are for each teacher?

WRITTEN WORK

1. A farmer sold 38 hogs at an average price of \$26.75. How much did he get for all of them?
2. He also sold 17 head of cattle for \$1139.00. What was the average price per head?
3. He sold 34 tons of hay at \$11.40 per ton. How much did he get for his hay?
4. He bought 7 young calves at \$13.00 per head, and 11 pigs at \$7.50 per head. How much did these cost him?
5. A man worked 27 days at \$2.25 a day. How much did he earn?
6. A man is paid \$1764 for his year's work. How much per day is this if he works 294 days in the year?
7. A man bought an automobile for \$1750, used it two years, and sold it for \$976. How much less than he paid for it did he get when he sold it?
8. A certain family had an income of \$2480 for the year. They spent \$480 for rent, \$650 for food, \$350 for clothing, and \$700 for other purposes, and saved the rest. How much did they save?
9. At 280 words on a page, how many pages and how many words over will there be in a book of 95,000 words?
10. How many square rods are there in one acre? How many acres are there in a field 45 rods wide and 80 rods long?
11. How many acres are there in a square field 160 rods on each side?
12. Draw a diagram of a piece of land $\frac{1}{4}$ of a mile wide and $\frac{3}{4}$ of a mile long. Let 1 inch represent 40 rods.

$1 \times 2 = 2$	$1 \times 3 = 3$	$1 \times 4 = 4$	$1 \times 5 = 5$
$2 \times 2 = 4$	$2 \times 3 = 6$	$2 \times 4 = 8$	$2 \times 5 = 10$
$3 \times 2 = 6$	$3 \times 3 = 9$	$3 \times 4 = 12$	$3 \times 5 = 15$
$4 \times 2 = 8$	$4 \times 3 = 12$	$4 \times 4 = 16$	$4 \times 5 = 20$
$5 \times 2 = 10$	$5 \times 3 = 15$	$5 \times 4 = 20$	$5 \times 5 = 25$
$6 \times 2 = 12$	$6 \times 3 = 18$	$6 \times 4 = 24$	$6 \times 5 = 30$
$7 \times 2 = 14$	$7 \times 3 = 21$	$7 \times 4 = 28$	$7 \times 5 = 35$
$8 \times 2 = 16$	$8 \times 3 = 24$	$8 \times 4 = 32$	$8 \times 5 = 40$
$9 \times 2 = 18$	$9 \times 3 = 27$	$9 \times 4 = 36$	$9 \times 5 = 45$
$10 \times 2 = 20$	$10 \times 3 = 30$	$10 \times 4 = 40$	$10 \times 5 = 50$

$1 \times 6 = 6$	$1 \times 7 = 7$	$1 \times 8 = 8$	$1 \times 9 = 9$
$2 \times 6 = 12$	$2 \times 7 = 14$	$2 \times 8 = 16$	$2 \times 9 = 18$
$3 \times 6 = 18$	$3 \times 7 = 21$	$3 \times 8 = 24$	$3 \times 9 = 27$
$4 \times 6 = 24$	$4 \times 7 = 28$	$4 \times 8 = 32$	$4 \times 9 = 36$
$5 \times 6 = 30$	$5 \times 7 = 35$	$5 \times 8 = 40$	$5 \times 9 = 45$
$6 \times 6 = 36$	$6 \times 7 = 42$	$6 \times 8 = 48$	$6 \times 9 = 54$
$7 \times 6 = 42$	$7 \times 7 = 49$	$7 \times 8 = 56$	$7 \times 9 = 63$
$8 \times 6 = 48$	$8 \times 7 = 56$	$8 \times 8 = 64$	$8 \times 9 = 72$
$9 \times 6 = 54$	$8 \times 7 = 63$	$9 \times 8 = 72$	$9 \times 9 = 81$
$10 \times 6 = 60$	$10 \times 7 = 70$	$10 \times 8 = 80$	$10 \times 9 = 90$

$2 \times 10 = 20$	$4 \times 10 = 40$	$6 \times 10 = 60$	$8 \times 10 = 80$
$3 \times 10 = 30$	$5 \times 10 = 50$	$7 \times 10 = 70$	$9 \times 10 = 90$

ORAL EXERCISES

Cover up the answer column and read rapidly, giving the answers. Then cover up all but the answers and read the tables rapidly.

Also construct division tables. Cover them up and read in the same way.

Read the tables on the next page in the same way.

5 cents	=1 nickel
10 cents	=1 dime
5 nickels	=1 quarter
5 dimes	=a half-dollar
10 dimes	=1 dollar
4 quarters	=1 dollar
100 cents	=1 dollar

12 units	=1 dozen
8 quarts	=1 peck
4 pecks	=1 bushel
32 quarts	=1 bushel

12 inches	=1 foot
3 feet	=1 yard

4 gills	=1 pint
2 pints	=1 quart
4 quarts	=1 gallon

9 square feet = 1 square yard

7 days	=1 week
60 minutes	=1 hour
60 seconds	=1 minute
24 hours	=1 day

16 ounces	=1 pound
2000 pounds	=1 ton

5280 feet	=1 mile
320 rods	=1 mile
16½ feet	=1 rod
5½ yards	=1 rod
1760 yards	=1 mile
160 square rods	=1 acre
640 acres	=1 square mile

January,	31 days
February,	28 days
March,	31 days
April,	30 days
May,	31 days
June,	30 days
July,	31 days
August,	31 days
September,	30 days
October,	31 days
November,	30 days
December,	31 days

In a leap-year February has 29 days. An ordinary year has 365 days, and a leap-year has 366 days.

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